LEADERSHIP AND THE GROUP-INDUCED SHIFT: A FIELD STUDY OF A COMPLEX DECISION-PROBLEM

By

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LEADERSHIP AND THE GROUP-INDUCED SHIFT: A FIELD STUDY OF A COMPLEX DECISION-PROBLEM

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The use of problem-solving or decision-making groups is a common phenomenon in business organizations. The two major assumptions underlying the use of such groups are that solutions so produced will be of higher quality and greater acceptability to those who must implement them than solutions produced by individuals. Examination of the literature relevant to these assumptions suggests that both are subject to qualifications and that further research into both is required before the complete nature of those qualifications is understood.

The research question addressed in the present investigation was: What are the effects of deliberate attempts by certain key individuals to influence problem-solving groups toward a particular solution on (a) the quality of the solution and (b) the acceptance of the group solution by the individual members? The same-task, Pre-

group (individual) solution--Group solution--Post-group (individual) solution research paradigm of the Group-induced Shift research was employed. Comparison of initial individual solutions with group solutions provided information as to the relative quality of group versus individual solutions. Comparison of group solutions with subsequent final individual solutions allowed for an estimation of the acceptability of the group solutions.

Subjects were 16 intact sub-sets of real, on-going task groups in which the most influential member had been identified prior to the experimental session. The Desert Survival Problem, a complex, factual-decision problem with a correct solution, was the experimental task. Four experimental Conditions were created by varying (1) the quality of problem-relevant information interjected into the group (Good-Poor) and (2) the status of the individual who held the information (Leader-Non-leader).

Condition I: Leader-Good Information

Condition II: Non-leader-Good Information

Condition III: Leader-Poor Information

Condition IV: Non-leader-Poor Information

With respect to the quality of group solutions, it was expected that Leaders in possession of problem-relevant information would effectively influence their group solutions in the direction of that information, regardless of its objective quality, whereas Non-leaders would not. Specifically, in terms of mean improvement from Pre-group to Group solution, it was hypothesized that

I (most improvement) > II and IV > III (deterioration)

Obtained results were:

I and II (most improvement) > IV > III (deterioration)

Thus, the effectiveness of influence attempts was affected by the quality of the problem-relevant information as well as by the status of the source.

With respect to the acceptability of the group solution, it was hypothesized that group solutions in Conditions I, II and IV would represent conformity (true change) and those in Condition III, compliance (surface change). Therefore, the final solutions of subjects in Conditions I, II, and IV were expected to closely resemble the solutions of their groups, while those of subjects in Condition III were expected to more closely resemble their own initial solutions. As Condition II group solutions were expected to be poorer than initial individual solutions, the following specific hypothesis about mean improvement from Group to Post-group solutions was advanced:

III (improvement) > I, II, IV (no change)

Results fully supported this hypothesis.

Other results of the study suggest that both satisfaction with group interaction and confidence in group solution can, at least in established groups, exist independently of the objective quality of the group's problem solution. Finally, substantial support for a relationship between individual susceptibility to influence and scores on the Locus of Control Scale was found. This relationship was moderated by both source and quality of information.

Implications of findings for organizations and for further research are discussed.

I. INTRODUCTION

In a 1965 review of the state of group problem-solving research at that time, Hoffman writes: "One of the foremost difficulties (in evaluating this state) concerns the term 'problem solving' itself. Problem solving has been used with reference to tasks as varied as judging the number of dots briefly displayed on a large card, to producing answers to arithmetic reasoning problems, to solving the complex problems faced by the management of large business organizations" (p. 113). Davis (1973) has suggested that the fundamental difficulty lies in distinguishing between problem solving and decision making. Group decision tasks, according to Davis, emphasize the selection of a response from a set of mutually exclusive and exhaustive alternatives. Problem-solving tasks, on the other hand, emphasize the processing of information to construct response alternatives, one or more of which may or may not be "logically correct." In practice, it is difficult to maintain this distinction. In organizations, the construction of response alternatives to a particular problem is usually for the purpose of selecting one of these alternatives upon which to act; i.e., once the alternatives have been constructed they are treated as if they are exhaustive and the process becomes, in Davis' terms, a decision-making one. The term "decision-problem" (Davis, 1973, p. 98), used in the title of this dissertation, would seem to be

appropriate in such situations. For convenience, however, the term generally used in the body of the paper will be simply "problem" as much of the research reviewed does not take place in organizational settings.

The use of groups to confront problems and make decisions about dealing with these problems is a fact of life in the modern American business organization (Hoffman, 1965). Whatever the details of a particular problem, the distinguishing feature of the task confronting all such groups is that a single solution (answer, product, or action) representing the group is required (Kelley & Thibaut, 1969, p. 12).

Maier early distinguished between two dimensions of a solution to a problem--quality and acceptance (Maier, 1952). Quality refers to the decision itself and reflects the ability to produce and process information effectively. Acceptance "refers to the degree to which the group that must execute the decision accepts it" (Maier, 1963, p. 253). The assumptions underlying the increased use of problem-solving groups in organizations are that the solutions generated by such groups will have both higher quality and higher acceptance than those produced by individuals (Reitz, 1976, p. 371). This paper will examine these assumptions in some detail. In Section II a review of the literature relevant to the issues is presented. First the issue of the relative quality of group versus individual solutions to problems is considered. Three variables are examined. First, the literature relevant to the nature of the problem-solving task is reviewed. Second, the composition of groups, with particular attention to the homogeneity-heterogeneity dimension, is considered. Finally, the dynamics of group interaction are examined. In the discussion of dynamics is found the literature on cooperation-competition, status differences, and pressures toward

uniformity and the influence of these factors on communication processes in groups. Power and group cohesiveness receive particular attention with respect to their influence on the nature of the group product.

The question relevant to the second assumption underlying the increased use of problem-solving groups is: Are group-generated solutions to problems more acceptable than individual solutions? A review of the literature relevant to this question also is presented in Section II. This review leads into consideration of the conformity-compliance distinction and from there to an examination of some of the factors affecting individual susceptibility to influence.

From the general considerations of group processes presented in Section II, the transition to the particular is accomplished in Section III by means of a brief discussion of a particular line of group problem-solving research--the Risky Shift or Group-induced Shift. Out of this work comes the general research paradigm used in the present study; i.e., pre-test, group test, post-test. The Group-induced shift literature also provides the "benchmark" study for the present investigation--a 1971 Risky-Shift study by Boulanger and Fischer. That study investigated the disproportionate influence in groups of "natural" or emergent leaders. The purpose of the present study was to investigate the possible extension of the findings of those authors to real groups in a complex problem-solving situation.

The present study, described in Section IV, was specifically intended to increase understanding of the influence of emergent group leaders upon (a) group-generated solutions to problems (quality) and (b) subsequent individual solutions to the same problems (acceptance). The problem-solving task was selected in line with conclusions from the literature as to the type of task upon which groups may be expected to

perform better than individuals. The subject pool and experimental setting allowed for assumptions as to heterogeneity of group membership, cooperative organization of groups, and substantial group cohesiveness, all factors found to facilitate group problem solving. In addition, the availability of certain individual-difference information allowed for some consideration of the relationship of these variables to individual patterns of problem solution from pre- through group, to post-test.

II. BACKGROUND AND RELEVANT LITERATURE

Quality of Group Solutions to Problems

It has long been assumed that groups, by virtue of greater available resources, should be able to produce problem solutions of higher quality than individuals. Like most such broad assumptions, this one, while it will be seen to hold some validity, must be qualified. Major reviews of the literature in the area show that the relative problem-solving superiority of groups to individuals is neither clear-cut nor simple (Kelley & Thibaut, 1969; Shaw, 1976). At the outset, the nature of the task facing the individual or group has consistently proved to be an important moderating variable.

Nature of the Task

The two most common experimental designs for investigating individual versus group problem solving are (a) the same individuals solve problems alone and similar problems in groups (within-subjects design), and (b) one sample of individuals solves problems alone while a different sample solves similar problems in groups (between-subjects design). There are variations in the measures of performance which include quality of solution, time to solution, number of problems solved, and number of trials to solution. There is also considerable variation in the kinds of tasks utilized in this research. Examination of some of the literature will illustrate the critical role which the nature of the task has played in determining the conclusions which have been reached as to group versus individual problem-solving performance.

As discussed by Shaw (1976, p. 58), there are really two questions to be answered when comparing individual and group performance: (a) Is group performance superior to that of the average individual? and (b) Is group performance superior to that of the most proficient individual? The following review will look at studies in which (1) group performance is superior to both (a) and (b) above, (2) group performance is better than average but not as good as the best individual, and (3) group performance is inferior to individual performance.

Group performance is superior to individual performance. An early study by Marjorie Shaw (1932) has become a classic in the comparison of group and individual performance. Members of a class in social psychology were divided into two sets of subjects. In the first half of the experiment, members of one set worked in groups of four while those in the second set worked as individuals. Problems were of the puzzle-type, such as the well known Cannibal Problem. During the second half of the experiment, roles of the subjects were reversed. During this session, problems were of the type of picking the best location for a school or the best routes for two school buses, given certain information. Groups produced more correct solutions on both types of problems, but they were often slower.

More recently, Faust (1959) found that four-man groups were able to solve more anagram problems than were nominal four-man collections (four individuals working separately and given credit as a "group" for solution if any one individual achieved it). The task was sequential in nature--each anagram had to be unscrambled before the next one was attempted. Davis and Restle (1963) also found that groups solved more problems than did individuals. Problems in this study were of a puzzle type. Finally, Barlund (1959) found that four six-member real groups

reached significantly more correct decisions on a series of syllogism tasks than did comparable nominal groups. Additionally, 27 of the 29 groups outscored the member identified on a pre-test as being best at the task.

The foregoing review is, of necessity, sketchy, but the reader with even passing familiarity with the tasks mentioned will quickly perceive that they have two characteristics in common; they have multiple parts, and they are susceptible to division of labor. Group members can generate satisfactory solutions when individuals cannot by putting together (pooling) information not uniformly held among the members or by combining part solutions. The process may be thought of as one in which the various group members "cover" for one another's gaps in knowledge or problem-solving deficiencies. "Even if one member of the group knows much more than anyone else, the limited unique knowledge of lesser-informed individuals can serve to fill in some gaps in knowledge" (Maier, 1967, p. 240). But it goes beyond mere coverage of information gaps: "It has been shown that individuals get into ruts in their thinking . . . . The individual is handicapped in that he tends to persist in his approach and thus fails to find another approach that might solve the problem in a simpler way. Individuals in a group have the same failing but the approaches in which they are persisting may be different . . . . Since group members do not have identical approaches, each can contribute by knocking others out of ruts of thinking" (Maier, 1967, p. 240).

Evidence as to whether group problem solving is anything more than pooling; i.e., whether new responses not available in individual repertoires is made possible by the group process is mixed (Banghart & Spraker, 1963; Dunnette, et al., 1963; Lorge, et al., 1953; Permutter, 1953).

Group performance is above average individual performance. A second group of studies has found group performance to be above the average performance of individual subjects but generally below the performance of the best individual. An early investigation by Gurnee (1937) compared classroom groups and noninteracting individuals on multiple-choice achievement test performance (between-subjects design). The group performance scores were determined by majority vote. Results showed that group scores were superior to the average of the individual scores, but only approximated the scores of the best individuals. Still earlier, Marston (1924) found a trained "judge" (individual) to be more accurate than a "jury" (group) in reconstructing a staged classroom incident. The difference in performance between the juries and averages of non-trained individuals was not significant.

In later studies, Hudgins (1960) found that the arithmetic test performance of groups of fourth graders approximated the level of the best member (within-subjects design). Hall, et al., (1963) studied group and individual predictions made after seeing the first half of a movie as to what would happen in the last half. They found group decisions to be better than average individual decisions made before the discussion, but to be less accurate than the best individual pre-decision.

Studies finding group performance better than average individual performance tend to be fraught with methodological difficulties (see Shaw, 1976, pp. 58-61). Where results can be interpreted unambiguously, the problems on which group performance was compared with average individual performance tend both (a) to require few steps and (b) to have judgements or solutions which can be verified by all persons in

possession of the original facts of the problem. The first characteristic identifies such tasks as being neither so complex as to require more information and skills than one person can be expected to possess nor so complex that the group is likely to interfere with individual solution. The second characteristic implies that upon achieving the solution of such a problem, the individual can readily convince other group members of its validity. Kelley and Thibaut suggest that plurality support for the solution at the outset, or attainment of the solution by a high-status group member are alternate conditions under which a particular solution will be adopted (1969, p. 65). The last condition will be central to the study described in Section IV.

Group performance is inferior to individual performance. It has been stated that groups produce higher quality solutions than individuals to problems which have multiple parts and allow for division of labor and pooling of the results of this labor. On problems requiring few steps and having verifiable solutions it has been stated that groups still tend to have the advantage over the average individual problem-solver. Tasks which violate all of these conditions are those whose solution ". . . requires thinking through a series of interrelated steps or stages, analyzing a number of rules at each point, and always keeping in mind conclusions reached at earlier points" (Kelley & Thibaut, 1969, p. 69-70). Such problems might be called multiple-stage problems. They are not amenable to division of labor and the large number of possible lines of reasoning any individual may follow in confronting such a problem makes it difficult to demonstrate the correctness of a

given answer. On such tasks it appears that members of problem-solving groups interfere with one another more than they assist one another. Several studies are illustrative.

A 1958 study by Faucheux and Moscovici comparing individual and group problem-solving performance reported mixed results. On one series of tasks, group performance was superior. On another it was no better than the average individual and inferior to nominal group scores. Examination of the tasks involved showed the first set to have the previously-described characteristics of tasks on which group performance tends to be superior to individual performance. The second set, Euler's figures, required following a consistent strategy to solution. Similar results are reported by Lorge and Soloman (1959) and Davis and Restle (1963). On all of these tasks, it appears that group members created "noise" for one another; that is, "The verbalizations of several members who have started at different points and are pursuing different lines of reasoning are mutually disruptive" (Kelley & Thibaut, 1969, p. 70). The point is consistent with Zajonc's (1966) suggestion that the presence of others facilitates well-learned responses (performance) but interferes with less well-established responses (learning). The responses necessary to cope with the kinds of tasks described in this section tend to be ones which individuals in general have the least opportunity to rehearse. Additional data from these studies suggested that all members tended to contribute to the discussion whether their ideas were helpful or not (Davis & Restle) and that the difficulty of demonstrating the correct solution seemed to inhibit the contributions of proficient members (Lorge & Soloman).

The question to which this section of the present paper is addressed is: Do groups produce higher quality solutions to problems than individuals? A partial answer to that question has been developed. Groups do tend to attain better success than any member acting alone on certain types of problems. However, even if the cards are stacked in favor of groups by limiting the task to one on which group performance tends to be superior, additional considerations remain.

Composition of the Group

It is obvious that analysis of group problem solving cannot exist independently of the individuals who compose the group. "There can be no doubt that the kinds of individuals who make up a group constitute a set of powerful determinants of group behavior" (Shaw, 1976, p. 194). But the characteristics of the particular members of a group do not tell the whole story. Data from a 1960 study, for example, show clear differences in amount of problem-related activity, not only among members of any given group, but also among groups (Hoffman & Smith). Thus, "The particular pattern or combination of individuals making up a group is also highly important" (Kretch, et al., 1962, p. 463). It is this patterning or combination which is of primary concern here. The argument as to whether there is "really" such a "thing" as a group (opposed to a collection of individuals) will be sidestepped. The issue of focus is a comparison of individual and group problem solving. A group solution, as noted, is a product, answer, or action representing the individuals in the group. To this extent, the group may be seen to be "real" and individual differences may be conceptualized as differences among patterns in group composition.

Given the large number of individual characteristics and within-individual patterns of these characteristics in the world, there exists, of course, an infinite number of group combinations. To investigate the specific effects of even a small number of these combinations is both impractical and of questionable utility, as any one combination may be said to be a unique event. There does seem be be utility however, in giving some attention to one global dimension of group composition--heterogeneity versus homogeneity.

For purposes of this discussion, a heterogeneous group is composed of individuals who have different levels or "amounts" of some trait or characteristic. Homogeneous groups consist of members similar on that trait or characteristic. Obviously, groups may be heterogeneous with respect to some traits and homogeneous with respect to others. A group of females chosen at random from a large introductory psychology class, for example, will be homogeneous with respect to sex, but relatively heterogeneous with respect to intellectual ability and personality characteristics.

The literature offers a substantial number of studies utilizing heterogeneity-homogeneity of group composition as the independent variable of interest. Both the traits studied and the dependent variables examined vary widely. For present purposes, the dependent variable of interest is problem-solving performance. A brief review of the effects on this performance of heterogeneity versus homogeneity of group composition with respect to ability, sex, and certain personality traits is presented below.

Ability. The evidence with respect to heterogeneity versus homogeneity on the trait of ability (measured by pre-tests on the same or similar tasks or by scores on intelligence or aptitude tests) is

clear--superior performance results from superior ability (Laughlin & Betz, 1975). When the over-all ability levels of two groups are not comparable, groups with the highest proportion of high-ability individuals, be they heterogeneous or homogeneous in composition, perform better. But if the over-all ability level is comparable, heterogeneous groups usually perform better (Goldman, 1965; Laughlin & Branch, 1972). It is suggested that the explanation for this tendency to superiority is the same as that for the superiority of groups to individuals on certain kinds of tasks--there is likely to be greater range in problem-solving approaches in heterogeneous groups.

Sex. With respect to sex composition of groups and problem-solving performance, the literature is largely silent. Such evidence as is available suggests that mixed-sex groups perform more effectively than same-sex groups (Hoffman & Maier, 1961). More studies have investigated the effects of heterogeneous versus homogeneous group composition on conformity in groups (Luchins & Luchins, 1955; Reitan & Shaw, 1964; Tuddenham, et al., 1958). According to Shaw (1976), the evidence favors the conclusion that both sexes conform more in mixed-sex groups. No doubt this process seriously confounds investigation of the influence of sex composition on performance. The role of conformity in determining group products will be considered at greater length in a later section of this paper.

Traits. The largest number of investigations into homogeneity versus heterogeneity of groups utilize relative similarity on personality traits. Taken as a group, the trait studies, like the ability studies, show a slight tendency to favor heterogeneous groups when the criterion is problem-solving performance. Hall (1975) found heterogeneous groups

(formed on the basis of scores on the Fundamental Interpersonal Relations Orientation Behavior Scale) in a field study to be more productive than homogeneous groups. Hoffman and Maier (1961) formed heterogeneous and homogeneous groups on the basis of Guilford-Zimmerman Temperament Survey profiles. Heterogeneous groups produced a higher proportion of high quality solutions in three of the four studies where problems had quality solutions. A later study (Hoffman & Maier, 1966) confirmed these results. Finally, Sorenson (1973) found clear superiority in both quality and quantity of solutions on two intellective tasks for groups heterogeneous on the trait of creative potential as opposed to groups homogeneous on this trait. Creative potential was measured by scores on the Remote Associates Test and a test of Social Differentiation.

The implications of the findings outlined above relevant to heterogeneous or homogeneous groups with respect to problem solving are clear so far as they go. Heterogeneous groups tend to outperform homogeneous groups. The question, "Do groups outperform individuals?" then, must take congnizance of the relevant traits of both individual subjects and group composition. The problem is particularly acute with respect to ability. A group is, by definition, more heterogeneous than an individual. But the problem-solving superiority of heterogeneous ability groups to homogeneous groups is predicated on the basis that the over-all ability level of the two groups of subjects is equivalent. Particular care must be taken, therefore, in evaluating the relative superiority of problem solving performance of groups and individuals. It may be that within-subjects designs deserve more attention in such research.

With respect to the question which opened this section--Do groups produce higher quality solutions than individuals?--, there are now two partial answers available. (1) They do tend to perform better on certain types of tasks, but (2) this better performance on these tasks is dependent to some unknown extent on a heterogeneous mix of individual characteristics.

At this point it might be tempting to conclude that if one brings together a mixed group of bright individuals and presents them with a multiple-part problem with specifiable criteria for a good solution, the solution which the group develops will certainly be superior to that which any one member might have developed alone. Unfortunately, the mere presence of sufficient complementary information and skills is no guarantee that they will be used in making a decision. Certain group pressures can operate to interfere with or block the effective use of group resources.

Group Dynamics

As the term is used in the present paper, a problem-solving group is a collection of individuals interacting on a face-to-face basis. Group solutions are the result of group discussion as to the problem issues, alternatives, and probable outcomes of proposed solutions. Communication processes, therefore, are the means by which a group develops a solution to a problem. If group resources are to be utilized effectively, it is imperative that all members holding information relevant to the problem have the opportunity to communicate it. A first condition necessary for varied viewpoints to be heard and considered is that the group be cooperatively organized.

Cooperation - Competition. Hoffman writes: "Another contributor to ineffective problem solving is the failure to organize or plan the attack on the problem" (1965, p. 100). To "organize or plan an attack" it is necessary that group members be agreed on a common goal. Such agreement forms the base for cooperative organizations: ". . . in a co-operative situation group goals are homogeneous (i.e., members hold the same goal for the group) and in a competitive situation, group goals are heterogeneous (i.e,, group members hold differing goals for the group)" (Shaw, 1976, p. 324).

The effects of cooperative versus competitive group organization upon group processes have been extensively studied by Deutsch (1949 a & b). Several findings relevant to communication processes have consistently emerged from these investigations. Compared with competitively organized groups, those organized cooperatively showed greater diversity in amount of contributions per member, attentiveness to fellow members, mutual comprehension of communication, common appraisals of communication, and friendliness during discussion (1949 a). Deutsch makes the link between these findings and group productivity explicit: "To the extent that the results have any generality, greater group or organizational productivity may be expected when the members subunits are cooperative rather than competitive in their interrelationships. The communication of ideas, coordination of efforts, friendliness and pride in one's group which are basic to group harmony and effectiveness appear to be disrupted when members see themselves to be competing for mutually exclusive goals . . . . The implications for committees, conferences, and small groups in general appear fairly obvious" (1949 b, p. 230).

The discussion above has been directed toward the point that cooperative group organization facilitates communication necessary to the effective use of group problem-solving resources. In "real-life," however, there are few, if any, purely cooperative or competitive situations. Most everyday situations involve a complex set of goals and subgoals. In a problem-solving group, members have needs and goals relative to their relationships with other group members as well as a stake in the common group goal. The requirements of these two sets of goals may conflict. A member may withhold a valuable insight into the problem, for example, because his need to appear competent in the eyes of other group members requires that he not risk the possibility that his contribution will be "put down." Kelley and Thibaut state the implication of this "mixed motive" (Schelling, 1960) situation for communication as follows: "Taken together, the common and conflicting interest components create dilemmas for the group member over being open versus secretive, being honest versus deceitful, being trusting versus distrustful" (1969, p. 38).

Status. The nature and strength of needs which can put the member of a problem-solving group into a mixed motive situation may be expected to vary considerably from one individual to the next. However at least one characteristic of many groups--the presence of status differences among the members--has been found to have such consistent effects upon communication patterns that it might be considered an almost universal "mixed motive generator."

A person's position is his place in the social system. His status is the evaluation accorded that position (Shaw, 1976, p. 245).

Status is defined by the perceiver. Many positions carry almost universally agreed-upon high status--heads of state, scientists, and very wealth persons, to give some examples (Hodge, et al., 1964). In other cases, a position viewed by some as having high status may be viewed by others in an opposite manner. The head of a drug ring, for example, may have high status in the eyes of the street dealer while, at the same time, he is considered to be the "dregs of humanity" by the population in general.

Status may be both ascribed and achieved (Shaw, 1976, p. 245). Ascribed status is accorded the individual through no fault or merit of his own (e.g., age, kinship). Achieved status is based on individual achievement or failure. When the organizational problem-solving group is formed, some members may have ascribed status. The boss' nephew is a familiar example. Other status differences will be based on past achievements such as the attainment of a high position in the company. As group members interact, differential achievement within the group itself may reinforce initial status difference patterns or create new ones. The individual with the highest position in the organization may, in fact, make the greatest contribution to the group. Or the boss' nephew may be incompetent. At this point, however, the focus is on the effects of status differences upon communication, whatever the history of these differences.

The first statement to be made about the influence of status differences upon the pattern and content of communications is that, in general, more communications are directed toward high-status group member(s). A number of classic studies in the area have demonstrated this communication pattern both in the laboratory and

in the field (see Thibaut, 1950; Back, et al., 1950). Additional findings of these and other studies (see also Kelley, 1951; Worchel, 1957) reveal the content of communications directed toward high-status individuals to be more positive than those directed toward low-status individuals. Finally, studies have demonstrated that the participation and influence of members in problem-solving groups are directly related to the relative status of the members (Harvey, 1953; Sherif, et al., 1955). "These effects are primarily due to the human tendency to inflate expectations of performance by high-status individuals and to overevaluate the performance of high-status individuals" (Reitz, 1976, p. 380).

The implication of the findings outlined above for group problem solving are considerable. Status differences among members can affect information sharing, processing, and evaluation and, through its effects on these variables, considerably affect the nature of the group product. Of particular impact may be the unwillingness of low-status members to criticize suggestions of high-status members (Janis, 1972). The disproportionate influence of certain group members upon the nature of the group solution to a problem was the specific focus of the research project to be described in Section IV of this paper. The point to be emphasized at this stage is that the kinds of communication processes necessary to the efficient use of group problem-solving resources may be considerably disturbed by the presence of status differences within the group.

To recapitulate, it has been stated that groups achieve solutions to problems by means of communication. Communication processes

are facilitated by cooperative group organization. But even within cooperative groups distortions in communication are likely to occur as the result of the presence of status differences. The next section will address yet another barrier to the efficient utilization of information in groups.

Pressures toward uniformity in groups. Even in group situations where members might feel no status constraints against certain kinds of communications, the free exchange of ideas, evaluation of suggestions, and consideration of outcomes and alternatives relative to a problem may be considerably hampered by other forces. Chief among these forces is a pressure toward consensus or unanimity. Part of this pressure stems from the nature of the task which the group is confronting; i.e., a group solution is required. As Maier notes, this requirement tends to set up a situation in which "Reaching agreement in a group is often confused with finding the right answer . . ." (1967, p. 241). Support for this statement is found in a description by Hoffman of the behavior of subjects in his own investigations of group problem solving: "We have often had subjects who violently opposed the majority's solution announce their capitulation with 'I thought we were all supposed to agree'" (1965, p. 101).

Pressures toward unanimity stemming from definition of the task as one of reaching an agreed-upon solution may be expected to exert more influence upon the nature of the final solution than the initial elicitation of ideas about the problem (although the latter effects will certainly occur as disagreements about some points reduce the time available for

raising others). From this perspective, the situation is a bargaining one. Disagreements will be settled on the basis of the balance of power and the relative successes of influence attempts within the group.

Influence is defined by Collins and Raven as ". . . a change in cognition, attitude, behavior, or emotion of P (person) which can be attributed to O (other)" (1969, p. 160). The ability to influence stems from power: "If O is capable of influencing P with respect to certain state, we say that O has power over P with respect to that state" (Cartwright & Zander, 1968, p. 216). The factors affecting individual susceptibility to influence attempts will be discussed in IIB. Attention will be turned here to a brief consideration of the sources of power for members of problem-solving groups. French and Raven have distinguished five types of power: reward, coercive, legitimate, referent, and expert (Cartwright & Zander, 1968, p. 263).

The basis for reward power is the ability to administer positive reinforcement. All group members possess this power to a certain degree in that they are in a position to verbally reinforce statements of other members (see Crowne & Strickland, 1961). Additionally, in real-life groups, one or more members may hold specific reward power over others in that they may be "the boss" outside the group (or may be perceived to have the ear of a superior not in the group). Finally, in both experimental and real-life groups, one member may hold the power to distribute rewards for participating in the group or rewards attached to the outcome of the solution.

Coercive power is based on the ability to punish or withhold positive reinforcement. The remarks of the preceeding paragraph are also applicable here.

Legitimate power stems from some sort of code or standard--cultural values, social structure, designation--by virtue of which it is agreed that an individual has power. Reward and coercive power are often closely associated with legitimate power.

Referent power is based on identification. If P is so highly attracted to O that he wishes to be like, or have a close association with O, then O has referent power. A unique feature of referent power is that its effect may operate totally independently of the possessor--one individual may influence the behavior of another without being aware of doing so.

Expert power is called "informational power" by Deutsch and Gerard (1955). It will vary with the extent of the skills and knowledge attributed to the source. French and Raven (1959) note that expert power exerts influence primarily on cognitive structures.

The various power bases briefly described above are seldom independent. Possession of one is often associated with possession or acquisition of others. In the problem-solving group, the actual balance of power relationships is apt to be extremely complex.

It has been stated that the perceived requirement for an agreed-upon solution puts many problem-solving groups into a bargaining-type situation and that the nature of the final solution will depend to some extent upon the distribution of power within the group and the outcome of attempts on the parts of members to influence one another in the direction of particular arguments or

proposed solutions. The significance of this process for the quality of the end product is discussed by Maier: "In reaching consensus or agreement, some members of a group must change . . . . If persons with the most (objectively) constructive views are induced to change, the end-product suffers; whereas if persons with the least constructive point of view change, the end-product is up-graded" (1967, p. 243). With this point the present discussion moves still closer to the empirical investigation to be described in Section IV. There are still, however, a number of issues to be addressed before turning to that investigation.

As pointed out earlier, part of the pressure toward unanimity in problem-solving groups stems from the perceived nature of the task and this pressure tends to have its greatest effect upon the nature of the solution. It is conceivable that such pressure can lead to "knock down, drag out" fights, "hung juries" and other such abortions of the problem-solving process in groups composed of members who do not like one another and/or hold differing perceptions of the group's goal. Such groups may be said to be characterized by low cohesiveness.

Definitions of group cohesiveness vary (see Shaw, 1976, pp. 197-198). A simple one is proposed by Cartwright: ".... group cohesiveness refers to the degree to which members of a group desire to remain in the group" (1968, p. 91). Desire to remain in a group is commonly stated to be a function of the attractiveness of the group. This attraction will depend on such factors as the attractiveness of individual members and attractiveness of group goals. Groups with high status, groups whose members have similar backgrounds and

similar attitudes, successful groups, and groups with successful members, for examples, have been found to have greater cohesiveness than groups without these characteristics (Reitz, 1976, p. 325). Other factors increasing cohesiveness receive less attention, but may be equally important. "Cohesiveness would include not only the attraction that group holds for its members but also any other force operating on the individual to stay in the group" (Kiesler & Kiesler, 1970, p. 65). Chief among these other forces may be the alternatives to membership in a particular group.

Thibaut and Kelley (1959) suggest that individuals evaluate the rewards and costs associated with group membership in terms of certain internal standards. The Comparison Level (CL) is a standard against which the attractiveness of a group is evaluated. The Comparison Level of Alternatives (CL-alt) is a standard against which the individual decides whether to stay in a group or leave it. Theoretically, some or all members of a group may have a strong desire to remain in the group, not because it is particularly attractive in an absolute sense, but because it is more attractive than the available alternatives.

Whatever its source, group cohesiveness is a powerful force for unanimity within groups. "Perhaps the most widely reported characteristic of cohesive groups is the greater tendency of individual members to influence and be influenced" (Collins & Raven, 1969, p. 123). Of themselves, these attempts and successes at influence serve basic group maintenance functions (Shaw, 1976, p. 198). The relationship of pressures to unanimity arising from a desire to keep the group together and effectiveness of group problem solving is complex. On

the one hand, some level of cohesiveness is necessary for a group to tackle a problem at all. "Whether a problem-solving orientation is taken or not depends first on the readiness of the group members to attempt to keep the group intact" (Kelley & Thibaut, 1969, p. 3). On the other hand, a very high level of group cohesiveness may lead to the replacement of independent creative thinking by what Janis (1972) has called "Groupthink." Groupthink refers to a "deterioriization of mental efficiency, reality testing, and moral judgement that results from in-group pressures" (Janis, 1972, p. 9).

Not all highly cohesive groups are afflicted by Groupthink defects in problem solving, but a high level of cohesiveness is a necessary condition for the phenomenon to occur. It appears, therefore, that for purposes of effective group problem solving, some level of group cohesiveness sufficient to allow for solving the problem, but less than that which puts concern for group maintenance and image above concern for the work at hand, is desirable.

Given that some level of group cohesiveness is required for effective group problem solving, the question becomes: What effect do the pressures toward uniformity resulting from cohesiveness have on problem-solving processes? Remembering that the means by which a group reaches a solution to a problem is communication, brief attention will be given to the effects of cohesiveness upon group interaction.

A first effect of cohesiveness on interaction is on amount of verbalization. Studies suggest that there is greater communication in cohesive groups (Lott & Lott, 1961; Moran, 1966). Additional

evidence strongly suggests that verbal exchanges in cohesive groups are more positive in tone than are those in non- or low-cohesive groups (Back, 1951; French, 1941; Shaw & Shaw, 1962).

Lewin (1947) emphasized the need for fact-finding and objective appraisal of alternatives in making decisions. It might be expected that the increased communication and general positive tone of cohesive groups would facilitate the free expression of ideas necessary to obtaining the facts and evaluating the alternatives. To a certain extent, evidence supports this expectation. Members of a highly cohesive group feel freer to deviate from majority opinion than members of other groups (Kiesler & Corbin, 1965). Persistent deviancy, however, will first result in increased communication toward the deviant and finally in rejection of the deviant by the group (Schacter, 1951). The extent to which communication patterns in cohesive groups will detract from elicitation of ideas relevant to the problem, therefore, will depend to a considerable extent on how quickly group opinion becomes solidified. Until it does, the standard of "deviancy" is loose. Once the group achieves a high degree of like-mindedness, however, information important to the best solution of the problem is likely to be rejected if it is inconsistent with the consensus. Maier has analyzed this process in terms of valence of solutions (1967). His research shows that the first solution which reaches a certain value (in his system of calculating solution valences) is adopted by the group 85% of the time (Hoffman & Maier, 1964). "Higher quality solutions introduced after the critical value for one of the solutions has been reached have little chance of achieving real consideration" (Maier, 1967, p. 241). Thus, the quality of the end product of group problem-

solving processes in cohesive groups will, through the kinds of communication patterns peculiar to such groups, vary considerably.

Summary

It will be useful to return once again to the question to which the foregoing review of the literature has been addressed: Do groups produce higher quality solutions to problems than individuals? The answer can now be stated as follows: The quality of a group solution to a problem depends upon (1) the nature of the problem, (2) the composition of the group, and (3) the nature of the communication processes by which the problem solution is sought. To the extent that (1) the problem has multiple parts and a demonstrable solution, (2) the group contains a heterogeneous mix of competent individuals, and (3) status differences and pressures toward uniformity do not seriously distort or prematurely truncate fact-finding and discussion of the issues, it may be expected that the greater resources available to a group will be utilized to produce a solution of higher quality than would be produced by any one member acting alone. Attention will now be turned to the second assumption underlying the use of organizational problem-solving groups.

Acceptability of Group Solutions to Problems

The gist of the "acceptability argument" is as follows: "Many problems require solutions that depend upon the support of others to be effective. Insofar as group problem solving permits participation and influence, it follows that more individuals accept solutions when a group solves a problem than when one person solves it.... A low quality solution that has good acceptance can be more effective than a higher quality solution that lacks acceptance" (Maier, 1967, p. 240).

Before proceeding to examine this agrument, it must be pointed out that it contains an implied qualifying clause; that is, this argument assumes ". . . . that the outcomes of all members (of the problem-solving group) will in some manner be determined by that (group) product" (Kelley & Thibaut, 1969, p. 12). In real-life groups, the extent to which this assumption is true can vary substantially. Certain groups make decisions which affect them only indirectly (e.g., a legislative committee which allocates funds to a University system). Other problem-solving groups are made up of representatives of those who must implement the solution (e.g., union-management bargaining teams). Finally, there are problem-solving groups which contain all individuals directly affected by the solution (e.g., group of employees who set their own production goals for a given period of time).

Organizations make use of all three types of problem-solving groups described above although the second type is probably the most common. It is not always clear which type of group is the referent when claims are made as to the greater acceptability of group-generated to individual-generated solutions. If the group is of the first type described, the situation would appear to be little different for those who must implement the decision from one in which the decision was made by an individual. (The primary difference would be the feelings of increased confidence in the validity of the decision which might result from the knowledge that more than one person made it.) Greatest acceptability gains would be expected when all persons involved participated in the problem-solving process with

the representative problem-solving group falling somewhere in between. A 1971 field study by Powell and Schlacter of varying degrees of participation in solving work scheduling problems supports these expectations. To avoid confusion, then, the present discussion will be limited to the relatively "pure" type of problem-solving group in which all members will be directly affected by the solution adopted.

Attitudes and Behavior

The acceptability argument for using groups to solve problems really has two parts. First, it is argued that participation in developing and planning the solution to a problem heightens understanding of the solution and committment to it (Thibaut & Kelley, 1959). Second, it is argued that the increased understanding and committment will be associated with behaviors conducive to more effective implementation of the solution. This is, of course, an argument based upon the concept of attitude. Attitudes are said to have three components--affective, cognitive, and behavioral (Reitz, 1976, pp. 257-258). The acceptability argument is predicated on the assumption that the first two components of one's attitudes toward the solution to a problem will be more favorable when the solution is arrived at by a group than by an individual and that this favorable orientation will lead to behaviors which facilitate implementation of the solution.

The literature generally supports the first of the above two contentions. Expressed satisfaction with solutions appears to increase when individuals participate in solution generation as

opposed to having the solution imposed upon them by one individual (Bragg & Andrews, 1973; Carey, 1972; Coch & French, 1948; Ivancevich, 1972; Powell & Schlachter, 1971; White & Ruh, 1973). The extent to which these more positive attitudes lead to behaviors which facilitate implementation of the solutions is another matter. Reviews of the appropriate literature reveal no one-to-one correspondence between expressed attitude and subsequent behavior (Brigham, 1971; Kiesler, et al., 1969; Wicker, 1969).

Kelman (1958) has suggested that before one can make any predictions about the way attitude changes will be reflected in behavior, one must know something about the nature and depth of the change. "It is not enough to know that there has been some measureable change in attitude: usually we would also want to know what kind of change it is. Is it a superficial change, on a verbal level, which disappears after a short lapse of time? Or is it a more lasting change" (p. 52). The distinction between superficial and lasting changes is often represented as a distinction between compliance and conformity.

Compliance-Conformity

Both conformity and compliance refer to changes in behavior resulting from real or imagined group pressure. Compliance is "...overt behavior which becomes more like that which the group wishes its members to show" (Kiesler & Kiesler, 1970, p. 3). Conformity refers to private acceptance--a "real" change in the direction of group attitudes and beliefs (Kiesler & Kiesler, 1970, p. 3). The only way to determine the difference between the two is to observe

what happens when the group is not present. If an individual continues to express the same attitudes or beliefs or to engage in behaviors which support these attitudes or beliefs, conformity is assumed. The argument for using groups to solve problems which is under discussion here is, then, based on the assumption that the unanimity represented by the group's solution is conformity, not compliance.

There are basically only two strategies for determining whether the belief in a group-produced solution implied by agreement with it represents an individual's "true opinion" as to the problem under consideration or whether it is a "surface" response to group pressure. One method involves giving each member of a group the opportunity to express his private opinion as to the best solution to the problem after the group has made its decision. The correspondence between group solutions and post-group-discussion private solutions is taken as a measure of conformity. Results generally suggest substantial positive correlations between individual and group solutions (see Muehleman, et al., 1976; Timmons, 1939).

The second method of investigating whether participation in generating a problem solution increases the chance that the solution will be implemented is to actually observe the behaviors of those who participated in the solution. The classic study of this nature was carried out by Lewin and his associates during World War II (Lewin, 1947). The problem to be solved was to maintain nutritional standards of the American population in the face of a shortage of meat for civilans. The solution advocated by the experts was increased consumption of certain low-consumption meat items still in abundant

supply (heart, brains, etc.) and of milk, milk products, orange juice, and cod-liver oil. Lewin employed a number of traditional methods (lectures, appeals to partiotism, etc.) to persuade housewives to buy more of the items named. An additional method involved housewives discussing the problem among themselves with experts available to answer questions. To test the effectiveness of the various methods, researchers followed up on the actual food-buying behavior of the participants. Results clearly indicated the superiority of the group discussion method; i.e., members of discussion groups increased consumption of the items named significantly more than did other subjects.

Other investigations into the changes in behavior resulting from group problem solving have yielded mixed results. In the Powell and Schlacter study (1971), there was no change in absenteeism rates following group determination of work schedules. In present terms, absenteeism was the problem and employee development of work schedules was the solution. Employees in participant groups expressed greater satisfaction with their work schedules than did employees in groups where changes were passed down by management, but they did not change their behaviors. On the other hand, the increased satisfaction with method of problem solving found by Bragg and Andrews (1973) was associated with both a decrease in absenteeism and an increase in production.

Evidence as to whether participation in solving problems and making decisions facilitates implementation of the solutions may be described as "conclusively inconclusive." If following through on a problem solution may be regarded as conformity and agreeing to a

solution (evidencing satisfaction with it) but not following through as compliance, one can say only that both appear to be elicited in problem-solving groups. As the unit of analysis of interest to organizations with respect to this question is the individual, it is appropriate to consider briefly some of the individual factors which determine whether an individual's subscription to a group solution to a problem represents conformity or compliance.

Susceptibility to Influence

The most powerful variable affecting the ability of others to influence an individual's "true belief" about the solution to a problem (i.e., to elicit conformity) appears to be what Kelley and Thibaut refer to as "stability of attribution" (1969, p. 7). In common terms, it is the extent to which the individual feels confident of the correctness of his own analysis of the problem and his own view of the best solution. Attributional stability has been found to be low with little soical support (Asch, 1951), poor or ambiguous information (Asch, 1951), problems too dificult for the person's capabilities (Coffin, 1941; Patel & Gordon, 1960), and other experiences engendering low self-confidence (Boomer, 1959; Kelley & Lamb, 1957; Hochbaum, 1954).

Obviously, in a group situation, confidence in one's own opinions and abilities is not an all-or-none phenomenon, but a relative one. In addition to making inferences about his own competence, an individual makes inferences about the competence of the group (Ettinger, et al., 1971). Whether an individual is "truly" persuaded by information

provided by other members of the group will partially depend upon his perception of his own competence relative to that of other members. This perception will be based upon the reputation which others bring to or establish within the group (credibility), on the compellingness of the arguments presented, and on the confidence which others appear to have in their own opinions (Kiesler & Kiesler, 1970).

There also appear to be certain personality variables which affect general confidence in one's own abilities. Evidence suggests, for example, that the individual described by Rotter (1966) as an "internalizer" (one who believes that what happens to him is primarily the result of his own actions) is less susceptible to certain kinds of influence than is is the "externalizer" (one who believes that what happens to him is largely beyond his control) (Minton, 1972; Ritchie & Phares, 1969; Sherman, 1973). Generally, however, the search for sovereign attributes of a "conforming personality" has not been especially fruitful (Hollander & Willis, 1967).

Assuming that an individual member of a problem-solving group is convinced that the solution toward which the group is moving is less than correct, what might make him go along with that decision; i.e., to comply? Kiesler and Kiesler have suggested a number of reasons (1970, p. 41-45). One is an interest in presenting a united front. "For the group to be perceived as accomplishing something, it often must also be perceived as not having internal disagreement" (p. 41). Another is a need to be liked, accepted, or, at least, not rejected. A related reason is the necessity for maintaining the

relationships within the group because of the expectation of future interaction as a group. It is also possible that one may desire to continue participating in the group's activities (even though there is no requirement to do so) and sees "not rocking the boat" as a price to be paid for staying in the group (Hollander & Willis, 1967).

Summary

Compliance can serve a wide variety of personal needs and perceived instrumentalities. Unless the consequences of a decision are perceived to be very personally important, it is not unlikely that the individual who sees the group consensus moving away from his own private opinion as to the best solution to a problem will go along with the group solution (Kelman, 1958). What happens after that cannot be predicted at the individual level. Both Festinger (1957) and Lewin (1947) make cases for the idea that counter-attitudinal behavior (in this case, ascribing to a problem solution one does not really believe in) tends to produce other behaviors consistent with that behavior (in this instance, implementing the solution). On the other hand, Brehm (1966) has suggested that an individual who complies to group pressure but does not privately accept the group's action may attempt to deal with this perceived threat to his freedom of action by behaving subsequently in a manner contrary to the group. There is, then, no simple answer to the question with which this section began: Are group produced solutions to problems more acceptable than individual solutions?

III. A PARADIGM FOR STUDYING GROUP PROBLEM SOLVING: THE RISKY SHIFT PHENOMENON

Section II of the present paper has given rather extensive attention to the literature relevant to the many factors which must be considered when examining the social situation called here "Group Problem Solving." Because organizations are moving increasingly toward the use of groups as opposed to individuals to solve their problems, the framework for that presentation consisted of an examination of the two primary assumptions underlying this shift--increased quality and acceptability of group-generated solutions. As stated, the study described in the next section was designed for the purpose of increasing understanding of those two assumptions. Before the specifics of that investigation can be presented, however, it is necessary to move out of the general literature addressed in section II and into a particular line of group problem-solving research--the Risky Shift.

Almost 15 years ago, a graduate student at MIT completed a Master's Thesis which has stimulated a large and still-growing body of related research. Reports of over 60 published studies and as many unpublished ones on the subject of the "Risky Shift" phenomenon (Stoner, 1961) appear in The Psychological Abstracts between 1972

and 1975. Stoner's initial conclusion that groups make riskier decisions than individuals ran directly counter to "conventional wisdom" as well as to then-prevailing views among social psychologists that group decisions will be more conservative than individual decisions or will represent averaging of individual decisions (Barlund, 1959; Farnsworth and Behner, 1931; Festinger, 1954; Krech, Crutchfield & Ballachey, 1962). Subsequent research with Stoner's paradigm has replicated his findings in a variety of settings (Bateson, 1966; Jamieson, 1968; Marquis, 1962; Wallach, et al., 1962) and in a variety of other countries (Bell & Jamieson, 1970; Lamm & Kogan, 1970; Rim, 1963; Vidmar, 1970).

As the body of related research built, it became apparent that the Risky Shift phenomenon was broader than originally conceptualized. A number of researchers have shown that items similar to those on Stoner's original Choice Dilemmas Questionnaire (CDQ) can be written so as to elicit a shift toward caution within the same paradigm (Nordhøy, 1962; Pruitt & Teger, 1967; Stoner, 1966). Others have demonstrated that Stoner's paradigm can be used to change expressed attitudes--a change which has been called "polarization" or "extremization" of opinions (Doise, 1969; Gouge & Fraser, 1972; Moscovici & Zavalloni, 1969; Myers & Bishop, 1970). Shifts have also been demonstrated to occur in situations where positive and negative consequences may actually result (Bem, et al., 1965; Blank, 1968; Pruitt & Teger, 1969). In accordance with these and other findings, Pruitt (1971) has suggested that a more appropriate name for this line of research might be "group-induced shift" (p. 340).

As Pruitt's term implies, choice-shift research involves group processes. The typical experimental design involves administering the CDO (or variant)[1] to subjects individually without their knowing they will have further exposure to the task. Following some experimental treatment, in which subjects meet as groups with the same task, a post-test measure is taken on an individual basis, group consensus basis, or both. Results have been remarkably consistent. Whatever the experimental treatment--group discussion to consensus, free discussion without consensus, observation of discussion, discussion with or without revealing initial choices of members--the scores of both groups and individuals tend to shift after the experimental treatment. The shifts vary, of course, in magnitude. Irrelevant group discussion and an irrelevant activity interposed between the two administrations of the choice instrument have failed to demonstrate a shift (Clark & Williams, 1970; Lamm & Kogan, 1970).

Despite consistent research findings, the practical significance of the choice-shift may be open to question. A review of the literature revealed the average shift per CDO item to be from six chances in ten to five in ten (Cartwright, 1971). Its heuristic value suffers no such limitations. As Cartwright points out: "A major reason for the

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[1]The CDO asks subjects to serve as advisors to hypothetical persons who are described as having to choose between two alternatives. One alternative is attractive but less likely to succeed than the other which is safe but not so attractive. Subjects give their advice on a scale of odds; the recommendation is in terms of the minimum odds of success they would require before suggesting that the less safe alternative be chosen.

great interest in the risky shift is that it has stimulated theoretical controversy" (1971, p. 361). Pruitt enlarges upon the point: "If, as it now appears, there are many dimensions on which groups differ from the average of the individuals who compose them and if, in addition, social psychology can develop an efficient theory about these differences, it will be a real accomplishment" (1971, p. 340). The theoretical issues are still far from settled (Myers & Lamm, 1976). At the heart of the controversy is the question of the group processes involved. It has been firmly established that group discussion is essential for the occurance of shifts. How this process works is still under investigation.

Many researchers have advanced theoretical explanations for the group-induced shift. The present research was not directed toward explaining the phenomenon so only a listing will be provided here for purposes of illustrating the diversity of the approaches: Leadership Theory (Marquis, 1962); Relevant Arguments Theory (Nordhøy, 1962); Diffusion of Responsibility Theory (Wallach, et al., 1964); Social Comparison Theory (Brown, 1965); Familiarization Theory (Bateson, 1966); Pluralistic Ignorance Theory (Levinger & Schneider, 1969); Release Theory (Pruitt, 1969); and Committment Theory (Moscovici & Zavalloni, 1969). The interested reader is referred to the references noted and to the December, 1971 issue of the Journal of Personality and Social Psychology for details of these alternative explanations for the group-induced shift.

IV. THE PRESENT STUDY

Background

The study proposed here makes use of the group-induced shift phenomenon. The focus, however, is not on risk-taking, but on problem solving. One conclusion of the review of the relevant literature presented in Section II was that solutions generated by groups may or may not be superior to those made by individuals depending upon the nature of the task, the composition of the group, and the dynamnicsof the group interaction. The group-induced shift research suggests that, whether they are better or not, group solutions to certain kinds of problems are different from the solutions made by the same persons acting as individuals. It also suggests that, under certain conditions, individual solutions will be different following group discussion from what they were before. The present study investigated the possible extension of these findings from the typical opinion problems of the group-induced shift research to a complex, factual problem which has a correct (optimal) solution. The group-induced shift paradigm was chosen for its usefulness in exploring the two assumptions underlying organizational use of problem-solving groups; it allows for both a comparison of individual and group decisions (quality) and for an estimation of the extent to which the group solution represents individual conformity or compliance (acceptance).

Leadership

The specific focus of the reported investigation was the possible disproportionate influence of one member of a group upon the solution to a problem developed by that group. The usual label attached to this person is "Leader"; i.e., that person who has relatively greater influence potential in a relationship (Gold, 1958).

As discussed in a previous section, power arises from a variety of sources. For present purposes, it is sufficient to dichotomize these bases into legitimate and social (including reward, coercive, referent, and expert); the two kinds of leaders associated with these bases will be called "formal" and "emergent" respectively.

The effects of formal leaders upon group processes have been studied fairly extensively. Hoffman provides a capsule summary of this research: "The presence of authority relations in a group seems to change the character of the discussion . . . . the group has to spend considerable time either supporting or rejecting his views rather than seeking for alternatives . . . . Status differences affect the behavior of those who are high in authority as well as those with little power. Placing a person in a leadership position generally influences his actions in the group" (1965, pp. 108-109). With regard to the latter point, Meadow & Zander (1965) found the high-status person in a group to be more involved with the group's goals, to be more concerned that the group be correct, and to perceive that he has greater influence over the group than other members.

The effect of formal authority relations within a group on the nature of the group solution to a complex problem appears to be fairly clear. Unless the leader takes steps to separate the "discussion leading" function from the functions of contributing and evaluating ideas, the group solution will be more like the initial preferred solution of the leader than of the other members (Torrance, 1955; French & Synder, 1959). The critical "steps" to be taken include developing the "solution mindedness" (Maier, 1967) of the group by encouraging the free expression of ideas, insisting that minority viewpoints are heard, and discouraging the premature evaluation of ideas (Maier & Salem, 1952; Hoffman, 1965; Janis, 1972).

Many problem-solving groups are formally leaderless in the sense that no one person has been appointed or elected leader or chairperson. In most such groups, a dominant individual emerges who captures more than his share of the limelight (Hollander & Julian, 1965). This individual is usually referred to as the "emergent" leader. The literature on problem solving in groups is largely silent on the subject of whether this type of leader has the same kind of effects on a group-generated solution to a problem as a formal leader. Suggestions are found, however, in a 1971 Risky-shift study by Boulanger and Fischer.

The Boulanger and Fischer Study

Boulanger and Fischer placed stooges instructed to adopt either risky or conservative stands in 12 four-man discussion groups. Stooges were empirically selected on the basis of performance in pre-

experimental sessions. The usual group-shift paradigm was employed in these sessions (except that no post-test was administered), but only risk-oriented CDO items were used (see Nordhøy, 1962). Groups were required to discuss these items until a unanimous decision was reached on each. Two observers behind one-way mirrors recorded the number of suggestions made by each subject in the group discussions. Following group decisions on the risk-oriented items, subjects were individually asked a series of questions about the group discussions. On the basis of answers to these questions and observer records, leaders were identified.

The same subjects used in the earlier sessions were used in Boulanger and Fischer's experimental sessions. Subjects identified as leaders all agreed to serve as stooges and were briefed individually on their roles. Six control groups in which identified leaders were given no special instructions (but spoke individually with the experimenter for the same length of time as other leaders) brought the total number of groups in the study to 18. The experimental sessions were identical to earlier sessions except that the five conservative items from CDO were used and individual post-test measures were also taken. Data were total scores over caution items. Results showed a significant group shift on these caution-oriented items in the risky direction for the risky-leader groups and significant shifts in the cautious direction for the caution-leader and control groups. The cautious shift held up for scores on individual post-tests while subjects in the risky-leader groups reverted to original pre-group-discussion decisions when responding to the questionnaire items again individually.

Boulanger and Fischer interpret the results of their study as support for the leadership explanation of the Risky-Shift. As noted earlier, the present study is not concerned with explaining the Risky Shift phenomenon. The finding from the Boulanger and Fischer study of primary interest here is the differential effect on individual post-test performance of the three sets of leader instructions. The finding that risky-leader groups made significantly more risky decisions on caution-oriented items than other groups, but individual members of these groups reverted back to less risky pre-test solutions when given the chance to do so (whereas other group members did not) lends substantial support to the suggestion that "unanimous" group solutions do not necessarily reflect the true opinions of the individual group members.

The problems in Boulanger and Fischer's study were conceived for experimental purposes. They are heavily value-laden and their correct solution is a matter of opinion. The extent to which the findings of investigations employing the CDO, or variants thereof, generalize to problems of a type of more interest to organizations is unknown. The possible conceptual link between the two situations has been suggested by Vinokur.

> If for a given choice dilemma there is a preponderance of persuasive arguments for one alternative, then individual and group shifts in risk level are predicted to occur in the direction of the alternative favored by the arguments . . . . if group shift toward greater risk (or conservatism) following persuasive arguments is substituted for group movement toward better problem solving, then the analogy between the risky shift and group problem solving becomes apparent. It is for future research to determine whether the psycho-

> logical mechanisms underlying these phenomena are merely analogous or in fact identical. (1971, p. 86)

A survey of the literature since 1971 indicates that Vinokur's suggestion has been largely ignored.

Purpose of the Present Study

The present study investigated Vinokur's suggested analogy between the Risky-shift and group problem solving. The methodology was similar to that of Boulanger and Fischer, but was extended to include investigation of influence exerted by non-leaders. In addition, the investigation was moved from the laboratory to a controlled field setting in which "real" rather than ad hoc groups served as subjects. The specific research question addressed was: What are the effects of deliberate attempts by certain key individuals to influence their problem-solving groups in a pre-determined direction on (a) the group solution (quality) and (b) the post-group-discussion private solutions of individual members (acceptance)? In its approach to this question, the present study attempted to pull together a number of lines of investigation and to fill certain gaps in the existing literature. Specifically, it:

a) employed the group-induced shift paradigm in a more realistic problem-solving situation.

b) moved the group-induced shift paradigm into a field setting employing real groups.

c) investigated the effects of emergent leaders, as compared with formal leaders, on a group-produced problem solution.

d) compared private solutions of subjects after group discussion with decisions before. This comparison is almost totally lacking in the literature, even in the formal leader studies.

Method

Subjects

Subjects were students in two MBA (Master of Business Administration) courses at a large urban university. These two courses typically have an enrollment of approximately 40 students each. Classes meet two nights a week for two hours each session. Most of the students are employed full time and most are considerably older than the typical university day student. Thus, while subjects were students, they were also members of organizations--and therefore members of the relevant population to which results of this study might be generalized.

The MBA classes which made up the subject pool are taught on a work group basis. The first two or three class meetings of the term are devoted to a discussion of how the course will be conducted and to introductory lecture material. At the end of these meetings, students are divided into groups of varying size by the professor. For the remainder of the term, group members gather material on assigned topics outside of class and work as groups on this material in class. The professor is available at all times as a resource.

Two professors have taught one section of these classes in the manner outlined above for six years.[2] Both report observing that a

[2]Students of only one of these professors participated in the study. This professor holds a Ph.D. in psychology.

leader will consistently emerge in these groups somewhere between the second and third week of interaction and, with rare exceptions, that person will continue to occupy the leader position for the remainder of the term.

The existence of the particular type of classroom setting described above provided a unique opportunity for responding to the oft-cited need for experiments with "traditioned" groups (Lorge, et al., 1958; Cartwright, 1973; Dion, et al., 1970). There are two primary considerations behind calls for taking research into group processes outside the lab. One lies in the group development literature (see, for example, Bennis & Shepard, 1965) and relates to the readiness of a group to confront a problem. "...groups are sometimes handicapped...by their initial lack of organization. If they are studied over a longer time period (and hence, given the time to organize) or if allowed to attain organization by other means, they will often make a better showing. This point also argues for the desirability of studying existing groups, with relevant prior experience in addition to the ad hoc groups generally employed" (Kelley & Thibaut, 1969, p. 76).

The second primary reason for studying real groups has to do with the question of the group processes in these groups as compared with ad hoc groups. "Do the results obtained from 'artificial' groups functioning in a laboratory have any relevance for natural groups functioning 'out there' in the 'real world?' The argument of the critics is that laboratory groups cannot hope to re-create the richness of groups in the natural situations. Therefore, a principle

that operates in such ad hoc groups cannot be expected to operate in ongoing groups exposed to the complex pattern of variables that exists in the larger society. Furthermore, it is asserted that members of such (ad hoc) groups are probably not motivated, that the whole situation is regarded as a game..." (Shaw, 1976, p. 386).

The setting used in the present study was a compromise between reality and the control afforded by the laboratory. Subjects were students, but, as noted, they were also a subset of the relevant "real world" population. The groups had "history, tradition, and norms" (Hoffman, 1965, p. 126) to a degree substantially greater than that of the typical laboratory group if less than that of a very long term group. Similarly, while control in this situation was less than in a laboratory, it was considerably greater than would be possible in the typical organization setting. There are, of course, certain demand characteristics associated with a classroom. There is no reason to conclude, however, that these were any more detrimental to this investigation than the demand characteristics of the laboratory are to the laboratory experiment.

Given the nature of the present investigation, two variables whose control was of particular concern were group cohesiveness and the associated cooperation-competition dimension of group organization. Group cohesiveness has been discussed at some length in a previous section of the present paper (see pp.23 to 27). It was concluded that a certain level of cohesiveness, or motivation to maintain the group, is required at the outset if a group is to take on a problem-solving task. As Kelley and Thibaut note: "This motivation to maintain

the group appears to rest primarily on the members' beliefs that common interests are large and important in relation to individual ones. In short, members perceive a sufficient basis of correspondence to act in unison" (1969, p. 31).

In the present situation, the motive to keep the group intact could be assumed to be operative. Individuals unhappy with the class or with their groups dropped the course or changed groups very early in the term. The groups as they existed at the time of data collection had as goals the assimilation of course material and the achievement of a good grade in the course. Given the latter goal, it was also reasonable to assume that the groups were organized cooperatively. A substantial part of the grade in the courses used in the study is based on group performance. With respect to this component of the overall evaluation, each member receives the grade assigned to his group. Thus there is, in Thibaut & Kelley's terms "perfect correspondence" of outcomes. It is, in this sense, a pure cooperation situation. In reality, of course, the situation may be somewhat of a mixed motive one. Within groups, members may vie for acclaim, prestige, or prominence. The critical point, however, is that external rewards are distributed exactly evenly. The requirements that "common interests are large and important relative to individual ones" was undoubtedly met to a considerably greater degree than would be possible in the typical organizational setting and motivation to perform well was almost certainly considerably higher than in the typical laboratory setting.

The importance of the assumption that all members of experimental groups be about equally concerned that the group product be superior is illustrated by reference to the Cartwright and Zander analysis' of power and influence in groups. As these authors note: "Most theorists assume that influence should be viewed as a relationship between two social entities such as individuals, roles, groups, or nations" (1968, p. 215). The entity exerting the influence is designated the agent and the entity over which the influence is attempted, the target. In the present case, the agent is an individual and the target is the group. The object of the influence attempt is to bring about a particular group action. Unless it can be assumed that members of the group have a common goal, the analysis is meaningless.

In summary, the field setting chosen for this investigation allowed for satisfactory control of certain important variables known to influence group processes while also allowing for the investigation of certain aspects of these processes in "traditioned" groups.

A total of 77 subjects in 16 groups participated in the study. Group size ranged from four to six members. Subject age ranged from 22 to 44 with a median of 27. With respect to employment, 95% of the subjects were employed full-time, 3% were employed part-time, and the remaining 2% were full-time students. Thirteen, or 17% of the subjects were female and two, or 12.5% of the identified group leaders were females. Data were collected over three academic quarters.

Identification of Emergent Leaders

There were two sources of information as to the emergent leaders of groups in the present study--professor observations and peer

nominations. Professor nominations based on observations were obtained approximately half way into each term of data collection. A list of the two individuals in each group felt by the professor to have had the greatest general influence on group interaction to that point was given to the experimenter at that time. Approximately one week later, the professor used a few minutes of class time to ask each student to rank the members of his or her group from "most generally influential" to "least generally influential." Students were specifically instructed to include themselves in the rankings and to put themselves at the top if appropriate.

Gibb (1969) has stated: "There is good evidence that members of a group can identify reliably those individuals who exert most influence upon them and that leaders defined this way are closely correlated with leaders identified by external observers and by other criteria" (p. 211). A review of that evidence by Hollander (1964) supports Gibb's contention both as to the reliability and validity of peer nominations. In the present study, the various rankings achieved by each group member were summed and that individual within each group with the lowest total (i.e., highest ranking) was designated "emergent leader." Ties or near-ties occurred in five groups. In those cases, the names of the two individuals were written on slips of paper and a colleague of the experimenter chose "the leader."

The Professor nominations were used to check peer nominations: i.e., all individuals selected as emergent leaders were named by both peers and professors. In two cases this required an adjustment in procedure.

In those instances, there was a tie in peer nominations, but only one of the individuals had been identified by the professor as a leader. To maintain the professor check on leader selection, that individual was selected as the leader for purposes of the study.

Group Composition

As groups grow, the distribution of participation among the members becomes severely skewed (Bales & Borgatta, 1955; Stephan & Mishler, 1952). To increase the opportunities for all group members to participate in group discussion as well as to be consistent, for purposes of comparison, with the bulk of the small group literature, group size in the current study was limited to four to six members. This presented no problem at the lower end as groups in the classes used are never smaller than four. However, they are frequently larger than six--some have had as many as ten members. Therefore experimental units had to be formed within the limits of on-going work group size during the particular terms of data collection.

In addition to size, it was necessary for between-group comparisons that the ability (as measured by initial DSP scores) composition of the experimental groups be roughly equivalent. Finally, each group had to contain one, but only one, individual identified as a leader.

The size, ability, and leadership requirements of group composition resulted in some few members being "left out" of some groups as they existed in the classroom. In some cases, these were persons whose initial DSP score was too far, in either direction, from average performance. In others, they were simply individuals from

groups too large to be an experimental group. Finally, in those groups which had more than one emergent leader, as defined by peer and professor nominations, that individual not selected as the emergent leader for purposes of the study fell into the "left over" category. "Left over" group members from whatever category were formed into "patch-up" groups for the experimental sessions. As these groups consisted of members who did not have a history of working together as an intact group, their scores were not used in the analysis.

In summary, each experimental group consisted of all, or some sub-set up to six, of the members of an on-going classroom work group. Groups were roughly equivalent on ability to perform the task as individuals; that is, they were formed so as to not differ significantly on task pre-score means and standard deviations. Finally, each group contained one, and only one, individual nominated as the most influential in the group.

Instruments

The Desert Survival Problem (DSP). The task chosen for use in this investigation was the Desert Survival Problem (Lafferty, et al., 1972). As the title implies, the Desert Survival Problem presents subjects with a hypothetical situation in which they are the survivors of an airplane crash in the desert. It is assumed that both the pilot and the co-pilot were killed in the accident. A list of 15 items, supposed to be objects salvaged from the wreckage, is provided. The task is to rank these 15 items in order of importance for survival. Time limits for accomplishing this ranking are at the discretion of the experimenter or group leader and depend on the purpose for which the

the exercise is used. Suggested maximum times are ten minutes for an individual ranking and 45 minutes for a group ranking and these time limits were employed in the present study. The DSP score is determined by calculating the absolute difference between subject ranking and the correct ranking on each item and summing across all items. A perfect score would be zero. The poorest possible score is 112.

The correct ranking of the DSP items is based on over 2,000 actual cases in which individuals lost in the desert lived or died depending upon the survival decisions they made. Alonzo W. Pond[3] contributed the expert rankings based on the real-life cases and on his own experiences living for many years on deserts all over the world.

Scores for 2,620 individuals and 510 groups are reported in the DSP manual. Of these 510 groups, group performance was better than the average of the individual group members in 425 groups and poorer in 85. Of the various categories of subjects for which data are available, "mixed management" and college students are most relevant to subjects in this study. The average individual score for "mixed management" subjects is 61.11 and the average group score is 52.01 (156 groups). For college students, the average individual score is 69.41 and the average group is 66.67 (28 groups). The best group score ever reported is 10.0 (junior high students).

The choice of the DSP for the group task in the present investigation was based on several considerations. (1) The DSP falls into the class of problems most often delegated to organizational

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[3]Former Chief of the Desert Branch of the Arctic, Desert, Tropic Information Center of the Air Force University at Maxwell Air Force Base.

decision-making groups. As Hoffman notes, one of the forces behind organizational requirements for group problem solving is that ". . . . the information needed for most management decisions must come from a variety of sources whose functional interdependence requires its simultaneous consideration and evaluation by all concerned . . . ." (1969, p. 100). That is, it is assumed that various members of the decision-making body have different, but compatible, pieces of information, or different amounts of the same information, and the exchange of these pieces of information is essential for problem solution. In Thibaut & Kelley's terms, this type of task has conjunctive information distribution requirements (1965, p. 14) and it is, therefore, also the type of task on which groups may be expected to generate solutions superior to those of individuals. A statement from the DSP manual makes its inclusion into this classification of problems specific: ". . . . the Desert Survival Problem is really a test of how well a team can gather and utilize the various bits and pieces of information that each has on the subject" (Lafferty, et al., 1972, p. 3).

(2) The DSP is based on "real life" and informal evidence from individuals who have used it (including the author) suggests that it is highly effective in stimulating subject interest and involvement. Confidence in measures of performance on any experimental task is increased if it can be assumed that subjects were interested in the task and that they were trying to perform well. In the present case, these assumptions are critical. The usual situation in the classrooms used in this investigation is that students are very interested and very involved with the activities in their groups. The present

investigation sought to accomplish an experimental manipulation in a natural situation. Therefore it was essential that the task be sufficiently interesting to maintain the usual level of activity.

(3) The DSP has a correct (optimal) solution. The use of raters to evaluate the quality of a group decision is a standard practice in group decision research. Unfortunately, even when interrater reliability is quite high (e.g., .90 - .95), there is still 10% to 20% disagreement. The DSP makes it unnecessary to introduce such variance into the evaluation of group decisions. One score is obtained and that score may be directly compared to other scores in the same or other studies using the DSP without concern for the standards used to determine the evaluation. Additionally, as discussed in a previous section, verifiability of problem solutions also tends to give groups an edge over individuals.

(4) The DSP is typically used in a manner which compares individual scores before group discussion with group scores after discussion. While the usual intent behind the DSP is to train groups in effective decision making, not to demonstrate group shifts, the data are still appropriate for comparison purposes. Such data are especially useful in the present case as indicators of expected score changes from individual to group administrations.

In summary, the DSP was selected as the task in this investigation because it is conjunctive in nature, interesting to subjects, yields an objective score, and provides normative data. There were three administrations: Pre (individual), Group, and Post (individual). A copy of the DSP is to be found in the Appendix.

Group Interaction Questionnaire (GIQ): In the present discussion the point has been made repeatedly that one rationale for the use of problem-solving groups in organizations is the supposed increased acceptability of the problem solutions. In research in this area, acceptance has been most often measured by subjects' responses to a five- or six-point Likert-type question: "How satisfied are you with the group's solution?" However, the correlations between such satisfaction ratings and actual quality-of-solution scores tend to be uniformly low (Hoffman, 1965), suggesting that these ratings may be more influenced by freedom in the problem-solving process than by the perceived quality of the solution.

The dimension of satisfaction with group solution of primary interest in the study reported here was the extent to which subjects accepted or rejected that solution in a subsequent private expression of opinion as to the correct solution (the third administration). However, in the interests of shedding additional light on that measure, as well as for purposes of consistency with the literature, it was felt that the more traditional measure should be included. In response to the question raised by Hoffman, the usual single Likert-type item was replaced by two such items--one dealing with satisfaction with group interaction and one with confidence in the group's solution to the problem. Together, these two items constitute the Group Interaction Questionnaire, a copy of which is to be found in the Appendix.

Semantic Differential (S-D): Likert-type measures of satisfaction, such as those described above, have been criticized for both limited

reliability and the underlying unidimensional nature of the attitude construct which is implied (Scott, 1967). "Factor analytic studies of morale inventories have shown, if nothing else, that there are discernable aspects of the work surroundings to which individuals differentially respond" (Scott, 1967, p. 8). One approach to this differential responding is the semantic differential technique (Osgood, 1952). This technique uses bipolar adjectives set against concepts; a subject differentiates the meaning of a concept by placing a check mark at the point between the adjectives (7-point scale) which best represents his reaction to the thing signified by the concept.

Scott and his colleagues have factor-analyzed semantic differential data from a large number of organizational settings (Scott, 1967, private communication) for a variety of job-related concepts. One of these concepts, "Me at Work," has consistently yielded five primary factors: General Affective Tone (I), General Vigor (II), General Emotionality (III), Personal Worth (IV), and Personal Committment to Organizational Demands and Factors (V). The "Me at Work" concept (re-labeled "How I Felt During the Group Discussion") was included in the present study for purposes of gaining information as to actual interest in the task (assumed, in advanced, to be substantial) and reactions to the group interaction processes. An established instrument, rather than a study-specific one was used to facilitate scoring and interpretation. Scott's subjects were similar enough to those used in the present study (in that they were generally white-collar members of organizations)

to engender satisfactory confidence in the use of this questionnaire. A copy of the "How I Felt During the Group Discussion" semantic differential is to be found in the Appendix. It, together with the GIQ, was administered once - after the group discussion and solution and before the final individual administration of the DSP.

In summary, dependent variable data available for each subject in the present investigation were as follows:

a) Pre-group-discussion DSP score

b) Group DSP score

c) Post-group-discussion DSP score

d) Difference scores relative to a, b, and c above (b-a; b-c; a-c)

e) Two scores from the GIQ

f) Five factor scores on the S-D

In addition to the nature of the experimental treatment (see next section), three additional pieces of independent-variable type information were available for each subject: Final course grade; Score on Rotter's Locus of Control (I-E) Scale; and Level of Confidence in initial (Pre-group) decision (6-point Likert-type item ranging from zero--Very Uncertain--through five--Very Confident).

Experimental Manipulation

A basic purpose of the current study was to follow up the Boulanger and Fischer finding that an emergent leader in an interacting problem-solving group will influence the decision of that group in the direction of his own predisposition. In that study, the predisposition was an assigned risk or caution orientation. The instructions given to the leaders were general "stance" instructions.

The present task is very different from the Choice Dilemma Questionnaire used by Boulanger and Fischer. CDQ decisions are largely based on values; the DSP solution depends on knowledge of facts about the environment. The predisposition in the latter case will be in the nature of a good solution to the problem or a poor one relative to these facts. General "stance" instructions are inadequate in this case. A good score on the DSP results from making the fundamental decision to stay at the crash site and wait for rescue. A "stance" instruction might be to "argue for a ranking of items based on the decision to stay at the crash site." It is to be expected, however, that individuals will vary widely on how this instruction is carried out; that is, they will have very different ideas of what a ranking based on the decision to stay at the crash site should be. The same may be expected for a ranking based on the decision to leave the crash site and attempt to walk to safety--a poor decision.

The information generated in the group discussion has been found to be a major factor in group-induced shifts (Silverthorne, 1971). To bring some of the potentially wide variation in information resulting from general instructions under control, "dummy" rankings were substituted for the original rankings of key individuals when original rankings were returned to all subjects prior to the group discussion (see Procedure). Instruction sheets were attached to all individual rankings and, in the case of the dummy rankings, this instruction sheet explained the nature and purpose of the substituted ranking. (See Appendix for copies of all experimental instructions.) This instruction sheet was substituted for Boulanger and Fischer's pre-experimental-session instructions, as it was not to be expected that working subjects would be able to get to class early for personal

instruction. A pilot study found this information manipulation to be satisfactory. The professor reported that no key subjects raised questions or appeared outwardly puzzled or distressed by the instructions.

As the dummy rankings used in this study constitute information relevant to the task, it was necessary to provide a mechanism for separating information effects from leadership effects. The question is: Does the injection of information relative to a predisposition into the group influence the group solution to a problem in the direction of that predisposition regardless of who holds the information? In half of the experimental groups, therefore, the dummy rankings were given to individuals not selected as emergent leaders. Individuals to whom dummy rankings were given will hereafter be referred to as "key subjects." It should be kept in mind that one-half of the key subjects were identified leaders and one-half were not.

Dummy DSP rankings were constructed so as to yield either good or poor numerical scores equidistant from the pre-test average of the 80 individuals for whom pre-test data were available in the pilot study. These scores (Good--58; Poor--84) were used as guidelines in assigning experimental groups to either a "Good Information" (Good Info) or "Poor Information (Poor Info) condition. Experimental groups were assigned randomly to the "Leader" or "Non-Leader" conditions, but within each of these conditions, the pre-test scores of the key individuals were considered in assigning the groups to either the Good Info or Poor Info condition. Key individuals who were also Leaders received dummy rankings compatible with their own

initial pre-test scores; i.e., if they had a good score on the pre-test, their group was assigned to the Good Info condition. If their score on the pre-test was poor, their group was assigned to the Poor Info condition. Key individuals who were not leaders were selected so as to allow for a similar matching of original pre-disposition and dummy rankings.

The procedure described above was felt to be necessary as the entire thrust of this study is directed toward the real-life analogy of a situation in which the emergent leader of a group is committed prior to group discussion to a particular solution to a problem. There is a considerable body of literature which suggests that public behavior which is inconsistent with private beliefs (in this case arguing for a ranking of DSP items dissimilar from one's own ranking) has implications for both subsequent behavior and subsequent expressions of opinion on the subject (Carlsmith, et al., 1966; Helmreich & Collins, 1968; Hoyt, Henley, & Collins, 1972). The extent to which leaders and/or non-leaders could influence group decisions in a situation where they were arguing positions contrary to their own beliefs is an interesting research question in its own right, but in the present study counter-attitudinal arguments were avoided.

Procedure

The procedure followed in the present study can be summarized as follows:

1. The DSP was individually administered to all students in the classes from which subjects were to be drawn at the beginning of

the academic term. (This was done by the professor in conjunction with some other tests which are routinely administered each term at that time.)

2. Professor and peer nominations for group leaders were collected approximately one-half to three-quarters of the way into the term (data collected by the professor).

3. Experimental groups were formed on paper (see Group Composition and Experimental Manipulation). This was accomplished by the experimenter who then made up packets of experimental materials to be distributed by the professor at the time of the experiment. The distribution process was arranged so as to keep the professor "blind" as to the identity of the key individuals and the experimental condition of each group.[4]

4. The experimental session was conducted. It was presented as one of the usual class activities by the professor to maintain the naturalness of the situation. The session took place approximately three weeks before the end of each term of data collection and consisted of the following steps:

a. Pre-determined groups were formed in the classroom.

b. Original or dummy rankings were returned to subjects.

c. Subjects discussed the DSP in groups and arrived at a group solution.

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[4]The professor was, however, aware of the general purpose and hypotheses of the study as the use of his classes was made conditional upon his being satisfied as to the adequate design of the study, its value, and its usefulness as a learning tool for his students.

d. Subjects filled out the GIQ and S-D individually.

e. Subjects took the DSP again as individuals (groups broken up).

f. Professor de-briefed subjects and lead discussion of group problem-solving.

Figure 1 is useful as a picture of the experimental situation.

Hypotheses and Analyses

Data were collected at three times during this study. For convenience, these points will be referred to as Pre-group, Group, and Post-group. Experimental groups were formed so as to be equivalent (in terms of initial DSP scores) at the Pre-group data point. The primary focus of this study, then, was on changes from Pre-group to Group (as an indicator of quality of group solution) and changes from Group to Post-group (as an indicator of acceptance of solution).

With respect to changes from Pre-group to Group scores, the suggestions of Vinokur (1971), Janis (1972), and Boulanger and Fischer (1971) lead to the expectation that the emergent leader of a group will exert greater influence on the group's solution to a problem than will other members whether his/her preferred solution is objectively better or worse than those of the other members. In the present study's experimental Condition I, the identified emergent leaders of the groups were given information which made "their" preferred solutions objectively better than those of other group members. Therefore, it was expected that these groups would show the greatest improvement from Pre-group to Group of all Conditions; that is, good information in the hands of influential group members should supplement the usual individual-to-group improvement on the DSP.

Quality of Problem-Relevant Information	Information Received By: Leader	Information Received By: Non-Leader
Good	Condition I	Condition II
Poor	Condition III	Condition IV

Figure 1

The four experimental conditions.

Experimental Condition III was the opposite of Condition I. In these groups, emergent leaders were given information which made "their" pre-group solutions objectively poorer than those of other group members. Therefore, it was expected that these groups would do less well on the Group administration of the DSP than on the Pre-group administration; that is, the influence of the emergent leaders in Condition III was expected to override the usual individual-to-group improvement on the DSP.

In the remaining experimental Conditions (II and IV), the emergent leaders of the groups were given no special information. In these groups, leaders had their original rankings in front of them during the group discussion of the DSP. The good or poor information in these groups was given to non-leaders selected as described in the "Method" section. As non-leaders were not expected to exert disproportionate influence in the group, the expectation was that the groups in these two Conditions would improve from Pre-group to Group decision, as is typical on the DSP, but not as much as would groups in Condition I.

Expectations as to changes in performance from Group to Post-group administrations of the DSP in this study were based on the idea presented earlier that subscription to the decision reached by a group represents conformity in some cases and compliance in others. Under the usual (non-manipulated) group problem-solving conditions, these variables may be expected to be randomly distributed. Some members are truly convinced of the validity of the group solution while others have gone along with solutions which deviate (to differing degrees and in differing directions for the various individuals) from

what they privately believe to be the best solution. In such a situation, the expected value of the score of subsequent private expressions of opinion is close to the group score (see Davis, 1973; Muehleman, et al., 1976; Timmons, 1939). In the present study, experimental Conditions II and IV were normal in that experimental information was interjected into these groups by members whose influence was not typically greater or less than that of other group members. In these Conditions it was expected that, consistent with the literature, Post-group DSP scores would generally resemble Group scores.

In Condition I, the identified emergent leaders argued for an objectively good solution to the problem. As stated previously, improvement from Pre-group to Group decision is typical on the DSP. Boulanger and Fischer (1971) found that when the emergent leader of a group argued in favor of the position which is the typical end result of non-manipulated group discussion on the problem (in their case, a cautious position on the caution-oriented CDQ items), subsequent private expressions of opinion did not vary much from the Group decisions. As the present study was designed to investigate the extension of those authors' findings to a complex decision-making problem, the expectation was (by analogy) that Post-group scores of subjects in Condition I would be very close to Group scores (reflecting conformity in the group decision process). In a similar manner, Boulanger and Fischer found that, in groups where the leader had argued for a position contrary to the typical end result of non-manipulated group discussions (in their case, a risky position on the caution-

oriented CDQ items), subsequent private decisions reverted back in the direction of Pre-group-discussion opinions. In the present study, leaders in Condition III argued for a substantially poorer solution to the problem than those initially made by the members of their groups. Thus it was expected that, on the Post-group decision, members of Condition III groups would revert back toward their Pre-group-discussion scores (reflecting compliance in the group decision process).

Figure 2 illustrates the shifts which are expected to occur from individual Pre-group solutions to Group solutions to individual Post-group solutions for each of the four experimental Conditions. Specifically, it was hypothesized that:

H1: Mean change socres from Pre-group to Group DSP solutions will be positive in Conditions I, II, and IV (i.e., scores will be better on the Group solution) and negative in Condition III (i.e., scores will be poorer on the Group solution). Pre-group to Group change score means for the four experimental Conditions will order themselves as follows:

I (most improvement) > II and IV > III (deterioration)

H2: Mean change scores from Group to Post-group DSP solutions will be positive in Condition III (scores will be better on the Post-group solution). No change from Group to Post-group will occur in Conditions I, II, and IV. Group to Post-group change score means for the four experimental Conditions will order themselves as follows:

III (improvement) > I, II, and IV (no change)

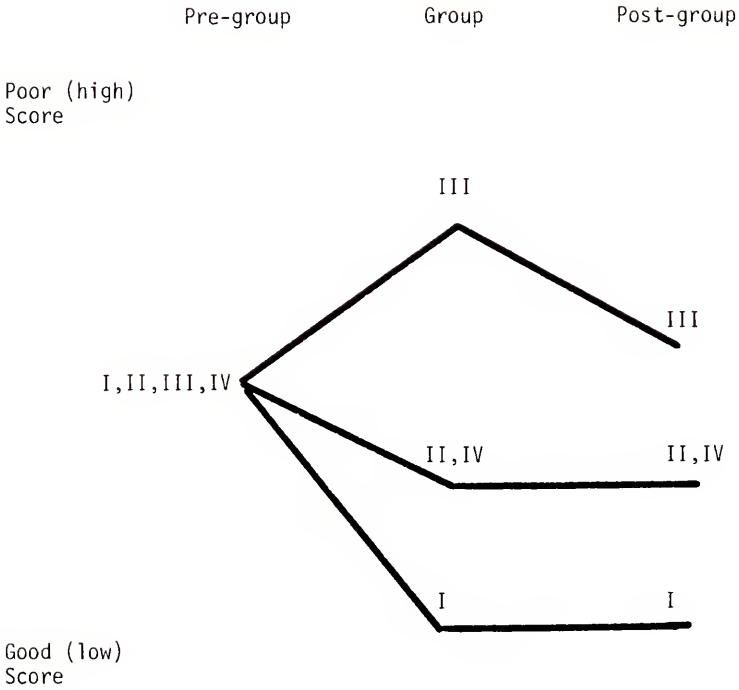

Figure 2

Expected score shifts for the four experimental conditions: I (Leader-Good Info); II (Non-Leader-Poor Info): III (Leader-Poor Info); IV (Non-Leader-Poor Info).

Raw data for testing Hypothesis 1 were algebraic differences between each subject's initial DSP score and the score of the DSP solution produced by that subject's group. For example, a subject with a Pre-group score of 70 in a group whose Group score was 54, would receive a change score of +16 (the plus sign indicating that the subject improved from Pre-group to Group score). If his or her Pre-group score had been 50, the change score would be -4 (the minus sign indicating that the subject's Pre-group score had been better than the Group score). The mean change score for each experimental Condition was determined by dividing the algebraic sum of all subject change scores in that Condition by the number of subjects.[5]

Duncan's New Multiple Range Test (Kirk, 1968, p. 93) was used to analyze the significance of the differences between the mean change scores in the four experimental Conditions. Hypothesis 1 predicts no difference between Conditions II and IV as there was no basis for such a prediction. However, so as not to lose any information about possible obtained differences between these Conditions, all pair-wise mean comparisons were examined. Such an analysis is, in fact, a combination of a priori, or planned comparisons (I vs. II and IV vs. III) and a posteriori, or after-the-fact comparisons (II vs. IV). Spearate multiple comparison procedures exist for the two kinds of comparisons. It is also possible to use both a priori

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[5]Consistent with the Boulanger and Fischer methodology, data from key subjects (n = 16) were not used in any of the analyses.

and a posteriori procedures in the same experiment. However, it was judged unnecessary to do so in the present case as the Duncan a posteriori procedure provides the required information with only a slight loss of power as compared with a priori tests.[6]

Raw data for testing Hypothesis 2 were algebraic differences between a subject's Group score and his individual Post-group score. Calculation of these figures and analysis of the data were accomplished as described above. In both cases, where the direction of a difference was hypothesized in advance, a one-tailed test of significance was used. Other comparisons were subjected to a two-tailed test.

Alternative Hypotheses

The focus of this investigation was on score changes over three trials on the same task. Hypotheses 1 and 2 state differences in the patterns of these score changes which were predicted among the four experimental Conditions. They are, then, hypotheses about the relative positioning of the Conditions at the three times of data collection (see Figure 2). There is, however, another approach which could have been taken.

There exists in the group problem-solving literature a considerable body of empirical work regarding the mathematics of the relationship between individual scores on experimental tasks and group

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[6](Dietrich, 1977, private communication). No over-all F-test was performed as such a test is not required when interest is in specific predictions, not in whether or not anything happened in the experiment (Kirk, 1968, p. 73). T-tests were not used as the comparisons to be made were not orthogonal. The various other comparison procedures available (LSD, Scheffé, etc.) were, for various reasons, less appropriate than Duncan in the present case. The interested reader is referred to Kirk for a complete discussion of the advantages, disadvantages, and appropriate usage of the most common multiple comparison procedures.

scores on the same or similar tasks. In the case of the Choice Dilemma Questionnaire, such analyses have involved subject-by-subject and item-by-item examinations of range, distribution, item intercorrelations, shifts from pre-test to group test, and so on (see for example, Burnstein, et al., 1971). This approach has served to to direct attention to the prediction of group scores through the utilization of various pieces of information about group members' initial scores (see Davis, 1973). Much of this attention has been focused on determination of the "best" model for predicting group scores. A major issue has already been mentioned: Do group decisions represent anything more than some combination of individual decisions?

The present study lends itself without much difficulty to the alternative approach described above. For those who prefer it, or are simply interested in making a comparison with the first approach, a set of hypotheses addressed specifically to the issue of score prediction has been developed. There is nothing new in these hypotheses. They represent only another perspective on the same investigation. From that perspective, there are five relevant pieces of numerical information about each group in the present context which are available for predicting the group's score: (1) the score resulting from the DSP ranking which the identified emergent leader has in front of him/her during the group discussion (Leader Score), (2) the score of the DSP which is manipulated; that is, that resulting from the ranking which the key subject has in front of him/her during the group discussion (Information Score); (3) the best Pre-group score in the group (Best Score); (4) the most extreme Pre-group score in the group (Extreme Score); and (5) the average of the scores of the individual group members on the Pre-group administration of the DSP (Average Score).

There are also several relevant pieces of numerical information available for predicting individual Post-group scores: (1) through (5) above, plus Group score, and the Pre-group score of the individual subject (Pre Score). The theoretical considerations outlined in connection with the first set of Hypotheses lead to the following alternative hypotheses relative to the best predictors of Group and individual Post-group DSP scores.

H3: The best predictor of the Group score will be the score of the solution for which the identified emergent leader of the group argues, whether or not he/she is the key subject in the group.

H4: The best predictor of individual Post-group scores in Conditions I, II and IV will be the Group score.

H5: The best predictor of individual Post-group scores in Condition III will be individual Pre-group scores.

Correlation analysis was used to test Hypotheses 3 through 5. Because the nature of the experimental manipulations created substantial intercorrelations among some of the variables involved (see Table 1), partial correlation coefficients were calculated (Nie, et al., 1976). This procedure allows for an estimate of the relationship between two variables when other correlated variables have been partialled out (controlled).[7]

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[7]Blalock (1963) has argued that this method of dealing with the problem of multicollinearity is inadequate due to the sensitivity of partial correlation coefficients to sampling error. In the present case, however, a means of estimating the accuracy of obtained coefficients is provided by results from a completely different approach to the same data.

Table 1

Zero-order correlation coefficients among experimental variables. (N = 61)

	Group Score	Pre Score	Information Score	Best Score	Extreme Score	Average Score	Leader Score
Group Score		-.17	.75	.18	-.02	.24	.73
Pre Score			-.25	-.18	-.10	.19	-.09
Information Score				.49	.10	.38	.63
Best Score					.39	.16	.17
Extreme Score						.03	-.19
Average Score							.43
Leader Score							

Results and Discussion

Pre-group DSP score means and standard deviations for each of the four groups within the four experimental Conditions are shown in Table 2. T-tests (two-tailed with pooled error terms) of group mean differences both within and between experimental Conditions revealed no significant differences. As these tests were not orthogonal, they were biased in favor of finding significant differences when, in fact, none existed (Kirk, 1968). Given that no differences were found with this liberal procedure, more conservative tests were not made.

The F-max test of group variance differences within and between Conditions also revealed no significant differences. Therefore, groups within the four experimental Conditions were considered to be equivalent on Pre-group DSP scores for purposes of tests of the stated Hypotheses.

Main Hypotheses

Over-all pattern of the results. Figure 3 is a graph of obtained experimental data. A comparison with Figure 2 which shows the predicted pattern of results reveals strong correspondence between the two so far as patterning is concerned. The depature of obtained from predicted lies in the mean Group score for Condition II. It will be recalled that the experimental information was given to non-leaders in Conditions II and IV. That procedure was followed in order to separate information effects, if any, from leadership effects, if any. Obtained results clearly indicate that both effects were obtained, but that information effects were assymetrical. Non-leaders with poor

Table 2

Pre-group DSP score means and standard deviations in the four experimental conditions.

	Mean	S.D.
Condition I (Leader-Good Info)		
Group 1	73.5	17.1
Group 2	72.2	9.4
Group 3	70.2	8.3
Group 4	70.6	17.0
Condition II (Non-leader-Good Info)		
Group 1	67.5	12.9
Group 2	67.4	7.7
Group 3	73.0	17.3
Group 4	73.5	9.1
Condition III (Leader-Poor Info)		
Group 1	70.7	12.6
Group 2	74.6	12.2
Group 3	73.0	9.0
Group 4	74.2	14.5
Condition IV (Non-leader-Poor Info)		
Group 1	69.6	8.9
Group 2	74.6	9.6
Group 3	69.6	7.3
Group 4	72.0	15.7

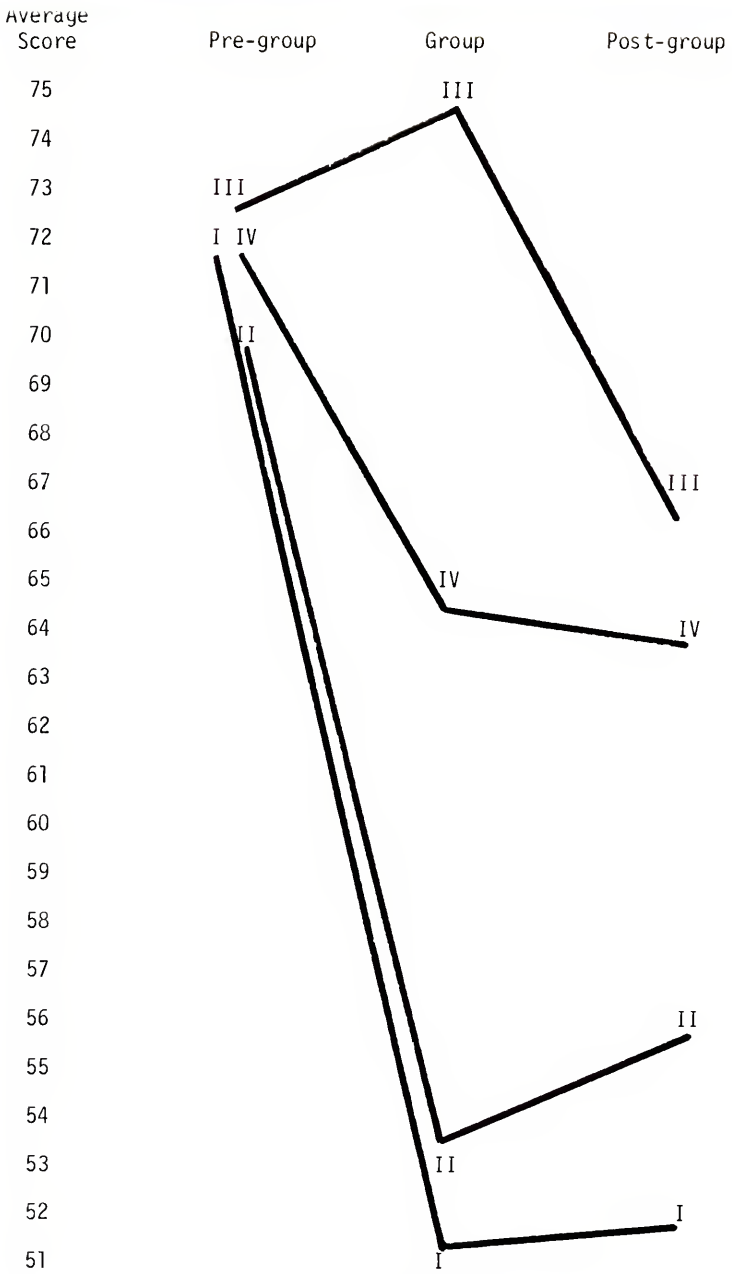

Figure 3
Obtained mean score shifts for the four experimental conditions over the three DSP administrations: I (Leader Good Info); II (Non-leader Good Info); III (Leader Poor Info): IV (Non-leader Poor Info).

information (Condition IV) influenced their groups to make poorer Group scores than groups with non-leaders with good information (Condition II), but this detrimental influence was markedly less than that exerted by leaders with poor information (Condition III). In the good information Conditions (I and II), however, non-leaders were about as successful as leaders in exerting a positive influence on Group scores.

Pre-group to Group changes. From a preliminary consideration of the obtained mean Group DSP scores, attention is now turned to the mean change scores from Pre-group to Group DSP administrations which are shown in Table 3. As predicted by Hypothesis 1, the mean change scores are positive in Conditions I, II, and IV and negative in Condition III. All means are different from zero at or beyond the .05 level of significance (one-tailed tests).

Results of the Duncan Test of the significance of the differences between the means shown in Table 3 are presented in Table 4. As predicted, the mean change in Condition I was significantly greater than the mean change scores in Conditions III and IV (one-tailed tests). Also, as predicted, mean change scores in Condition III were significantly lower than those in all other Conditions (one-tailed tests). The prediction that the mean change score in Condition I would be greater than that in Condition II (which had not been predicted to differ from Condition IV) was not supported (one-tailed test). The mean Pre-group to Group change score in Condition II was significantly different from that in Condition IV (two-tailed test) and not significantly different from that in Condition I (one-tailed test). Thus,

Table 3

Mean change scores from pre-group to group administration of the DSP by experimental condition.

Condition I	(Leader-Good Info)	25.67*
Condition II	(Non-leader-Good Info)	19.25*
Condition III	(Leader-Poor Info)	- 4.07*
Condition IV	(Non-leader-Poor Info)	3.63*

*$p < .05$ (t-test of Ho: $\mu = 0$; one-tailed-test)

Table 4

Duncan New Multiple Range Test of differences among the mean pre-group to group change scores.

	$\bar{X}_3$ (-4.07)	$\bar{X}_4$ (3.63)	$\bar{X}_2$ (19.25)	$\bar{X}_1$ (25.67)
Condition III: $\bar{X}_3$ = -4.07 (Leader-Poor Info)		7.7*	23.32*	29.74*
Condition IV: $\bar{X}_4$ = 3.63 (Non-leader-Poor Info)			15.62**	22.04*
Condition II: $\bar{X}_2$ = 19.25 (Non-leader-Good Info)				6.42
Condition I: $\bar{X}_1$ = 25.67 (Leader-Good Info)				

*$p < .05$ (test of Ho: $\mu_a = \mu_b$; one-tailed test)

**$p < .05$ (test of Ho: $\mu_a = \mu_b$; two-tailed test)

while the predicted mean ordering among the Conditions of Hypothesis 1 was obtained, the location of the "greater than" signs was shifted. Actual results were:

I and II (most improvement) > IV > III (deterioration)

Group to Post-group changes. Obtained mean change scores from Group to Post-group DSP administrations for the four experimental Conditions are shown in Table 5. As predicted by Hypothesis 2, the mean for Condition III is positive. It is different from zero at the .05 level of significance (one-tailed test). Mean change scores for Conditions I, II, and IV range from slightly positive to moderately negative. As expected, none of these means is significantly different from zero (two-tailed tests).

Results of the Duncan Test of the significance of the differences between the means shown in Table 5 are presented in Table 6. The prediction that the mean Group to Post-group change score in Condition III would be significantly greater than those in Conditions I, II, and IV, which, in turn, would not be significantly different from one another, was fully supported.

Alternative Hypotheses

Partial correlation coefficients between Group DSP scores and the various predictors are presented in Table 7. Hypothesis 3 predicted that the best predictor of the Group score would be the Leader Score. The highest coefficient actually obtained was between Information Score and Group Score, but this coefficient is not significantly different from that obtained between Group Score and Leader Score (test after Blalock, 1972).

Table 5

Mean change scores from group to post-group administrations of the DSP by experimental condition.

Condition I	(Leader-Good Info)	- 1.53
Condition II	(Non-leader-Good Info)	- 2.63
Condition III	(Leader-Poor Info)	6.21*
Condition IV	(Non-leader-Poor Info)	.75

*$p < .05$ (t-test of Ho: $\mu = 0$; one-tailed test)

Table 6

Duncan New Multiple Range Test of differences among the mean group to post-group change scores.

	$\bar{X}_2$ (-2.63)	$\bar{X}_1$ (-1.53)	$\bar{X}_4$ (.75)	$\bar{X}_3$ (6.21)
Condition II: $\bar{X}_2$ = - 2.63 (Non-leader-Good Info)		1.10	3.38	8.84*
Condition I: $\bar{X}_1$ = - 1.53 (Leader-Good Info)			2.28	7.74*
Condition IV: $\bar{X}_4$ = .75 (Non-leader-Poor Info)				5.46*
Condition III: $\bar{X}_3$ = 6.21 (Leader-Poor Info)				

* $p < .05$ (test of Ho: $\mu_a = \mu_b$; one-tailed test)

Table 7

Partial correlation coefficients: Group DSP scores with each predictor variable, controlling for all other variables (n=16).

	Predictor Variable				
	Leader Score	Information Score	Best Score	Extreme Score	Average Score
Dependent Variable					
Group Score	.58*	.62**	-.35	.17	-.21

*P < .05 (test of Ho: $\gamma = 0$)

**p < .01 (test of Ho: $\gamma = 0$)

Partial correlation coefficients between individual Post-group DSP scores and various predictors for Conditions I, II, and IV are shown in Table 8.[8] It can be seen that, consistent with Hypothesis 4, the highest coefficient obtained was between Post-group and Group scores.

Obtained partial correlation coefficients between individual Post-group DSP scores and the various predictors for Condition III are presented in Table 9. Despite the sharply reduced degrees of freedom when this Condition is analyzed alone, the Hypothesis 5 prediction that Pre Score would be the best predictor of Post-group Score in this Condition is supported.

In general, results of the analyses of Hypotheses 1 and 2 and results of the analyses of Alternative Hypotheses 3, 4, and 5 are consistent.[9] Combining the data from all Conditions, as was done for the correlational analysis of Hypothesis 3, revealed Leader Score and Information Score to be the two most powerful predictors of Group Score. The Condition by Condition analysis of Hypothesis 1 suggests that this finding results from a strong, but assymetrical, information effect (obtained in addition to a leadership effect).

Results of the analysis of Hypothesis 2 are supported by the correlational analyses of Hypotheses 4 and 5: Subjects in Condition

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[8]Hypothesis 4 was based on the expectation that the forces acting in these three Conditions would be the same at this stage, regardless of the nature of the information which had been interjected into the groups. Therefore, these Conditions were combined for this analysis.

[9]Therefore, with respect to Blalock's caution, it is noted that this correspondence tends to increase confidence in the obtained partial correlation coefficients. Without such a cross-check, Blalock's argument would suggest that the obtained coefficients could not be interpreted.

Table 8

Partial correlation coefficients: Post-group DSP scores with each predictor variable, controlling for all other variables. Experimental conditions I, II and IV (n = 47)

	Predictor Variable						
	Group Score	Leader Score	Information Score	Best Score	Extreme Score	Average Score	Pre Score
Dependent Variable							
Post-group Score	.53*	.20	.21	.19	.12	-.04	.26

* $p < .01$ (test of Ho: $\gamma = 0$)

Table 9

Partial correlation coefficients: Post-group DSP scores with each predictor variable, controlling for all other variables. Experimental condition III (n = 14)

	Predictor Variables						
	Group Score	Leader Score	Information Score	Best Score	Extreme Score	Average Score	Pre Score
Dependent Variable							
Post-group Score	.00	**	**	.00	.00	.00	.64*

*$p < .01$ (test of Ho: $\gamma = 0$)

**no variance on this variable

III tended to revert back toward their Pre-group scores on the Post-group administration of the DSP and subjects in the other Conditions had Post-group DSP scores which were very close to the scores which their groups had achieved.

Other Analyses

In addition to analyses of the relationships predicted by the hypotheses, a number of exploratory or "data snooping" analyses utilizing the other information which was available were performed.

Locus of Control (I-E). Several analyses were carried out to follow up suggestions in the literature as to differences between individuals whom Rotter (1966) labeled "Internalizers" and those he labeled "Externalizers" (see p. 34, this paper).[10] Ryckman, et al., (1971), for example, found that Internalizers are generally more confident about their own performance than are Externalizers. No difference between the two groups on Pre-group DSP solution confidence expression was found in the present study by any method of analysis.

Sherman (1973) reported Externalizers to be more influenced by persuasive messages than Internalizers. No such over-all relationship was found in the present study. I-E scores did not correlate significantly with any measures of change: Pre-group - Group ($r = .04$), Group - Post-group ($r = .08$), or Pre-group - Post-group ($r = .07$). However, closer examination of these data yielded results of considerable interest. These results are described below.

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[10] In all cases, Internalizers were arbitrarily defined as individuals scoring below the mean I-E score for all subjects in the study and Externalizers as individuals scoring above the mean.

Ritchie and Phares (1969) found that Externalizers changed more when the influence attempt came from a high-prestige source than from a low-prestige source. Internalizers, on the other hand, were more responsive to the content of the communication and changed equal amounts whatever the source. Further, Kelley and Thibaut (1969) report that Internalizers more generally take an information orientation toward tasks, are more critical of the information put forward, and are less attentive to the hedonistic aspects of the group interaction than are Externalizers. Combining the Ritchie and Phares and the Kelley and Thibaut reports and formulating them in terms of the present study, leads to the following expectations about the change performance of those who scored high on the I-E scale (Externalizers) versus those who did not (Internalizers).

1. Change scores for Externalizers will be higher in the two high-prestige (Leader) Conditions (I and III) than in the two low-prestige (Non-leader) Conditions (II and IV).

2. Change scores for Internalizers will be higher in the two Good Information Conditions (I and II), regardless of the source of the information, than in the Poor Information Conditions (III and IV).

A rough test of these expectations was carried out using change scores from Pre-group to Post-group (selected as the two data points at which individuals should have had the freest opportunity to express their real opinions). Results of the analysis are presented in Tables 10 and 11. Despite the crude definition of the two groups, results are consistent with the expectations and are significant statistically.

Table 10

Mean pre-group to post-group DSP change scores for Internalizers and Externalizers by source of information.

	Leader	Non-leader	Dm
Externalizers (n=25)	15.1	7.7	7.4*
Internalizers (n=34)	17.1	14.2	2.9

*P < .025 (t-test of H_o: $\mu_a = \mu_b$; two-tailed test)

Table 11

Mean pre-group to post-group DSP change scores for Internalizers and Externalizers by quality of information.

	Good Information	Poor Information	Dm
Internalizers (n=34)	23.8	7.5	16.3*
Externalizers (n=25)	14.4	8.7	5.7

*$P < .001$ (t-test of H_0: $\mu_a = \mu_b$; two-tailed test)

Course grades. There was not sufficient variation in final course grades for subjects in this study to make this information useful. All but two subjects received A's or B's. No differences were found between any of the groups used in the experiment in the number of A's relative to the number of B's awarded at the end of the term.

Pre-group confidence in correctness of decision. Mean change scores from Pre-group to Group, Group to Post-group, and Pre-group to Post-group for each of the six levels of confidence in Pre-group individual DSP solution are shown in Table 12. The small number of cases in the lower confidence range make statistical tests untenable, but the observed mean change scores are in line with Kelley & Thibaut's (1969, p. 6) suggestion that the more confident an individual is in his position, the less likely he is to change that position. Mean Pre-group to Group and mean Pre-group to Post-group change scores decrease as expressed confidence level in initial solutions increases. (No pattern is discernable for the Group to Post-group change scores, but it will be recalled that these changes were not significantly different from zero in three of the four experimental Conditions).

Group Interaction Questionnaire (GIQ). The number of subjects reporting the various levels of "Satisfaction with Group Interaction" (GIQ question 1) in the four experimental Conditions is shown in Table 13. The majority of subjects in all Conditions reported being either "Satisfied" or "Very Satisfied" and no over-all differences in reported degree of satisfaction between Conditions were found.

Table 12

Mean change scores by level of expressed confidence in pre-group DSP solutions.

	#Cases	Change Scores		
		Pre to group	Group to Post	Pre-Post
Level of Confidence				
0 (Very Uncertain)	0			
1 (Uncertain)	3	25.0	5.0	21.0
2 (Somewhat Uncertain)	5	19.5	4.0	19.0
3 (Somewhat Confident)	10	12.0	5.0	11.6
4 (Confident)	10	9.5	9.5	10.8
5 (Very Confident)	7	9.0	7.0	10.0

Table 13

Number of subjects in each experimental condition reporting the six degrees of "Satisfaction with group interaction" (GIQ Question 1).

Degree of Satisfaction	Cond.I (Leader Good Info)	Cond.II (Non-leader Good Info)	Cond.III (Leader Poor Info)	Cond.IV (Non-leader Poor Info)
0 (Very Dis-satisfied)				
1 (Dissatisfied)	1			
2 (Somewhat Dis-Satisfied)			4	1
3 (Somewhat Satisfied)	2	6		1
4 (Satisfied)	6	9	8	9
5 (Very Satisfied)	6	1	2	4

Examining the results of the GIQ satisfaction question by mean Group to Post-group change scores yields the results shown in Table 14. The only finding of interest is a tendency for subjects who responded "Very Satisfied" to have a lower mean change score, regardless of Condition, than subjects who responded "Satisfied" or Somewhat Satisfied" ($.10 > p > .05$; two-tailed tests).

The number of subjects reporting the various levels of "Confidence in Group Decision" (GIQ question 2) is shown in Table 15. As with satisfaction, confidence was generally high and no significant differences between the experimental Conditions were found. Group to Post-group change scores for the six levels of confidence across Conditions are shown in Table 16. No significant differences were found between any of the reported confidence levels.

Semantic-Differential (S-D). Mean scores of the five "How I Felt During the Group Decision" scales for the four experimental Conditions are presented in Table 17. Scores on all five scales were above average according to norms presented by Scott. There were no significant differences between Conditions on any of the S-D scales and attempts to relate scores on the various scales to other study variables were not successful. The possibility that the S-D might prove a more sensitive measure of personal reactions to the group problem-solving process than the simpler Likert-type items of the GIQ did not materilaize in this study. It appears that this instrument served primarily as a check on interest and involvement in the experimental task and this check supported the initial assumptions that both would be high.

Table 14

Mean group to post-group change scores for subjects reporting the six degrees of "Satisfaction with group interaction" (GIQ Question 1).

Degree of Satisfaction	
0 (Very Dissatisfied)	-
1 (Dissatisfied)	2.0
2 (Somewhat Dissatisfied)	4.2
3 (Somewhat Satisfied)	8.6
4 (Satisfied)	7.0
5 (Very Satisfied)	3.5

Table 15

Number of subjects in each experimental condition reporting the six levels of "Confidence in group decision" (GIQ Question 2).

Levels of Confidence	Cond.I (Leader-Good Info)	Cond.II (Non-leader Good Info)	Cond.III (Leader Poor Info)	Cond.IV (Non-leader Poor Info)
0 (Very Uncertain)	1		1	
1 (Uncertain)				
2 (Somewhat Uncertain)		2	2	2
3 (Somewhat Confident)	3	1	3	8
4 (Confident)	7	8	5	4
5 (Very Confident)	4	4	3	2

Table 16

Mean group to post-group charge scores for subjects reporting the six levels of "Confidence in group decision" (GIQ Question 2).

Level of Confidence	
0 (Very Uncertain)	5.0
1 (Uncertain)	-
2 (Somewhat Uncertain)	5.8
3 (Somewhat Confident)	4.2
4 (Confident)	6.9
5 (Very Confident)	6.8

Table 17

Mean semantic-differential scale scores for the four experimental Conditions.

	Cond.I (Leader-Good Info)	Cond.II (Non-leader Good Info)	Cond.III (Leader Poor Info)	Cond.IV (Non-leader Poor Info
Scale I				
General Affective Tone (Maximum Score=28)	21.1	20.4	20.1	20.4
Scale II				
General Vigor (Maximum Score=28	21.1	22.9	22.9	22.8
Scale III				
General Emotionality (Maximum Score=21)	14.9	12.5	12.8	12.4
Scale IV				
Personal Worth (Maximum Score=21)	15.6	16.0	15.6	15.6
Scale V				
Personal Committment to Organizational Demands and Factors (Maximum Score=84)	62.8	66.6	66.1	65.4

Summary and Conclusions

So far as they can be directly compared, results of the current study are consistent with those of the 1971 Boulanger and Fischer investigation which provided the take-off point for this effort. Groups in the current study whose leaders argued for good solutions (Condition I) produced good solutions just as groups in the Boulanger and Fischer study whose leaders argued for conservative stands on caution-oriented items made conservative decisions. Leaders in the present study arguing for poor quality problem solutions (Condition III) influenced their groups toward poor solutions just as leaders arguing for risky stands on the conservative CDQ items influenced their groups toward risky decisions in the Boulanger and Fischer study. In both investigations, Post-group scores of individuals in groups whose leaders argued for the usual end-result of group discussion on the task (good solution or conservative decision) remained close to the group score while Post-group scores of subjects in groups whose leaders argued in the opposite direction reverted back toward initial scores.

With respect to the quality of group-generated solutions to complex problems, the present study of the influence of emergent leaders also fully supports results of studies in the formal leadership literature. Like a formal leader, an emergent leader who argues for a preferred solution to a problem will influence the group solution in the direction of that solution. However, findings of the present study also suggest that the influence of a group's emergent leader can be moderated by the interjection of problem-relevant

information into the group. In the on-going, real-life groups used here, the effect of good information in a group was so strong as to make the status of the individual who held it relatively unimportant. But where the information was poor, the status of the possessor made a significant difference. These results are highly provocative and would appear to deserve follow-up research. Analysis of transcripts or video-tape records of experimental sessions (i.e., "process research") is one possible direction to take in such a follow-up. Another would be to combine the Conditions as they were set up here and pit Leaders with good information against Non-leaders with poor information in the same group (and vice versa).

Turning from the question of quality of group-generated problem solutions to the question of acceptance, data from the present investigation support the conclusions of research cited earlier that the single best guess as to an individual's privately expressed solution to a problem after he has taken part in a group-generated solution to the same problem is that it will closely resemble the group's solution. The single exception in the present study occurred, as predicted, with subjects in Condition III whose final solutions resembled their initial solutions more than they did the group solutions. WIth respect to the four experimental Conditions in the study then, it appears that changes from Pre-group to Group DSP scores represented conformity (true change) in Conditions I, II, and IV and compliance (surface change) in Condition III. Possible reasons for compliance in a group situation have been discussed at some length. In the present case, it is not unlikely that the stakes were simply too low for subjects in Condition III to risk upsetting the balance of relationships built up in their groups over some seven weeks by rejecting the problem solution for which their group leaders were arguing.

Results of the present study should serve as a warning to those who would embrace the "acceptability" argument for group problem solving too closely. At present, these findings can be only a warning. There was no investigation of what action those subjects who rejected the group solution in a subsequent private expression of opinion would take if group solutions were to be implemented. As discussed earlier, the two major contending hypotheses are (1) that they would behave in a way consistent with the group's solution (i.e., support implementation) to reduce the dissonance of having performed a public act inconsistent with their private beliefs (Festinger, 1957; Lewin, 1947), or (2) that they would behave in a manner contrary to the group (not support implementation) to reassert their personal feelings of freedom of action (Brehm, 1966).

To this point, this discussion has focused on findings relative to the major hypotheses of this study. From this base, it is of interest to briefly consider some of the other findings as they relate to those results.

As discussed in an earlier section of this paper, the concept of "satisfaction" is a recurring theme when problem solving in groups is the topic of discussion. And, in fact, reported satisfaction with group interaction was generally high in the present study. Further, there were no significant differences between Conditions on reported satisfaction although a tendency for more subjects in Condition III (Leader-Poor Info) to report some degree of dissatisfaction than those in other Conditions was observed.

As regards satisfaction with group interaction and acceptance of the group solution, present data yield only a suggestion for future

investigation: there was a tendency for subjects who reported being "Very Satisfied" to change less from Group to Post-group score, regardless of experimental Condition, than those who reported being either "Satisfied" or "Somewhat Satisfied."

The conclusion to be drawn at this stage with respect to member satisfaction with group interaction in problem-solving groups is that, until considerably more work has been done, it is probably unwise to put too fine a point upon it. Current results tend to support Hoffman's (1965) suggestion that such satisfaction can exist independently of the objective quality of the group-produced solution to the problem.[11] In addition, there is no real evidence that satisfaction is related to private acceptance of the solution.

With respect to the variable of "confidence" and the quality and acceptance of the group solution, findings of the present study are inconclusive. Over-all expressed confidence was high and no significant differences between Conditions were found suggesting that confidence also may be somewhat independent of the objective quality of solution. (In this regard, a tendency toward greater variation in expressed confidence in the two Poor Info Conditions --III, IV--may be worthy of further investigation.) No relationships between expressed confidence in group solution and either satisfaction with group interaction or acceptance of group solution (as measured by Group to Post-group change scores) were found.

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[11] It should be kept in mind that these subjects had received no feedback as to the accuracy of their group problem solutions when they responded to the satisfaction question. While such feedback might have changed reported satisfaction, the experimental situation is more typical of that which exists for members of organizational problem-solving groups. The quality of the solutions produced by such groups frequently cannot be evaluated until weeks, months, or years after they have been made.

The most interesting non-hypothesized finding of the present study is the support for previously reported findings that the Locus of Control (I-E) variable is related to susceptibility to influence. Internalizers were found to change more from Pre-group to Post-group in Good Info Conditions (regardless of the source of the information) than in Poor Info Conditions. Externalizers, on the other hand, were found to change more from Pre-group to Post-group under Leader (high-prestige) Conditions than under Non-leader (low-prestige) Conditions (regardless of the quality of the information).

Exactly what the practical implications of the finding just described for organizational problem-solving groups might be is unclear. It is not practical to form such groups on the basis of scores on personality measures such as the I-E scale. Even if it were, the question of the optimal composition of the group would be unsettled. Persons more responsive to the quality of the information than to the prestige of the source would seem to be desirable. But other reports (Kelley & Thibaut, 1969, for example) suggest that Internalizers are more generally confident about their own performance than Externalizers, and, as discussed earlier, confidence in one's own position has been found to be a major variable in resisting influence attempts. Practical considerations aside, however, present findings with respect to the I-E and susceptibility to influence seem well worth pursuit by those interested in the study of individual differences.

To summarize the primary findings of the current investigation; in the real-life, on-going groups studied:

1. Where the identified emergent leader of a group was instructed to argue for a particular solution to the problem presented to the group, the group's solution to the problem closely resembled that advocated by the emergent leader, regardless of the objective quality of that solution.

2. Good problem-relevant information interjected into problem-solving groups had a positive effect on the quality of the group solution to the problem, regardless of the status of the member who held the information.

3. Poor information interjected into a problem-solving group had a negative effect on the quality of the group solution to the problem, but this effect was significantly more detrimental when the information was in the possession of the group's identified emergent leader than when it was in the possession of another group member.

4. The individual-difference variable, Locus of Control, (I-E) was related to susceptibility of influence as measured by certain change scores. The nature of this relationship depended upon both the source and the content of the influence attempt.

5. There was some evidence that satisfaction with group interaction and confidence in group solution to a problem can exist independently of the quality of the group's solution to the problem, but these findings must be accepted with caution.

Many lines for possible future investigation have been suggested by results of the present study. "Process analysis" and investigations of the parameters of relative power balance and possession of expert information in the group have already been mentioned. Another set of questions, of considerable practical

significance to organizations which use problem-solving group, arises if one considers what would occur if the problem presented to the group were made still more realistic and members expected to have to implement their group solutions. Could the emergent leader still elicit compliance? Would information effects be more or less powerful? What would happen to Post-group private expressions of the best solution to the problem?

The lines of research suggested in the preceeding paragraph are directed toward questions which arise out of the usual interacting problem-solving group. There are, however, alternatives to this procedure available.

The present study suggests that one aid to improved group problem solving might be the presence in the group of an expert on the particular topic under discussion. This study does not answer the question of the effectiveness of this expert's information if the group's leader is arguing for a poor solution to the problem. Should research find that such a situation largely negates the contributions of the expert, a re-structuring of the format of the usual interacting problem-solving group may provide a safeguard against the leader's detrimental influence. The Nominal Group Technique (Delbecq, et al., 1975), for example, is specifically designed to equalize verbalization and to ensure that each group member's ideas become part of the group's frame of reference in developing the problem solution.

Other ways to cope with leader dominance of problem-solving groups by modifying the usual interacting format have been suggested

by Janis (1972, p. 222). These suggestions were made specifically for groups with formal leaders, but the principles could be applied to other groups as well.

1. Each group member should be assigned the role of critical evaluator with emphasis on raising objections and doubts.

2. The leader should avoid advocating specific proposals he would like to see adopted.

3. Several groups could be set up to work on the same problems.

4. Divide the problem-solving group into sub-groups from time to time with a different sub-group composition each time.

5. Discuss the problem with outsiders.

6. Bring outside experts into the group from time to time, but not as regular members.

7. Assign a devil's advocate and rotate this position.

8. Have a second-chance meeting sometime after the preliminary decision.

Janis' suggestions are straight-forward and would not be difficult to implement. As a set, however, they pre-suppose that the problem-solving group has a long time-frame. For the group operating under time pressures, it may be feasible to implement only a few of these suggestions. Systematic research into the question of which particular suggestion(s) would make the greatest positive difference to quality and/or acceptance of group-generated problem solutions would be time consuming, but the possible benefits to organizations of such research appear to be considerable.

Given the stakes invloved, it is surprising that so many organizations have uncritically accepted the validity of the assumptions that groups will produce higher quality solutions to problems and that these solutions will be more acceptable than if they had been produced by individuals. All available evidence suggests that the question of the validity of these assumptions must be answered: It depends. The present study, consistent with the literature, suggests that one of the more important factors upon which the validity of these assumptions depends is the leader of the problem-solving group. Another is the quality of the problem-relevant information available to the group. Both are factors over which the organization can exercise some control, either directly, or indirectly through modifications of the group problem-solving format.

APPENDIX A

INSTRUMENTS

THE DESERT SURVIVAL PROBLEM

Your Name_____
Course Name_____
Time Class Meets_____

THE SITUATION

It is approximately 10:00 A.M. in mid August and you have just crash landed in the Sonora Desert in southwestern United States. The light twin engine plane, containing the bodies of the pilot and the co-pilot, has completely burned. Only the air frame remains. None of the rest of you have been injured.

The pilot was unable to notify anyone of your position before the crash. However, he had indicated before impact that you were 70 miles south-southwest from a mining camp which is the nearest known habitation and that you were approximately 65 miles off the course that was filed in your VFR Flight Plan.

The immediate area is quite flat and except for occasional barrel and saguaro cacti appears to be rather barren. The last weather report indicated the temperature would reach 110° that day which means that the temperature ground level will be 130°. You are dressed in light weight clothing-short sleeved shirts, pants, socks and street shoes. Everyone has a handkerchief. Collectively, your pockets contain $2.83 in change, $85.00 in bills, a pack of cigarettes, and a ball-point pen.

THE PROBLEM

Before the plane caught fire your group was able to salvage the 15 items listed on the next page. Your task is to rank these items according to their <u>importance</u> to your survival, starting with "1" the <u>most</u> important, to "15" the <u>least</u> important.

You may assume-

1. There are five survivors including yourself;
2. You are one of the actual people in the situation;
3. You have agreed to stick together;
4. All items are in good condition.

Items			
1. flashlight (4 battery size)	____	____	____
2. jack knife	____	____	____
3. sectional air map of the area	____	____	____
4. plastic raincoat (large size)	____	____	____
5. magnetic compass	____	____	____
6. compress kit with gauze	____	____	____
7. .45 caliber pistol (loaded)	____	____	____
8. parachute (red & white)	____	____	____
9. bottle of salt tablets (1000 tablets)	____	____	____
10. 1 qt. of water per person	____	____	____
11. a book entitled Edible Animals of the Desert	____	____	____
12. a pair of sunglasses per person	____	____	____
13. 2 qts. of 180 proof Vodka	____	____	____
14. 1 top coat per person	____	____	____
15. a cosmetic mirror	____	____	____

GROUP INTERACTION QUESTIONNAIRE

1. Please indicate below (with a check mark) the extent of the over-all level of satisfaction you feel with respect to the intrapersonal interaction in your group during the Desert Survival Problem exercise.

   Very Satisfied _____
   Satisfied _____
   Somewhat Satisfied _____
   Somewhat Dissatisfied _____
   Dissatisfied _____
   Very Dissatisfied _____

2. Please indicate below (with a check mark) the extent of the over-all level of confidence you feel with respect to the decision which your group made for the Desert Survival Problem exercise.

   Very Confident _____
   Confident _____
   Somewhat Confident _____
   Somewhat Uncertain _____
   Uncertain _____
   Very Uncertain _____

Name_____

SEMANTIC-DIFFERENTIAL

HOW I FELT DURING THE GROUP DECISION

	Extremely	Quite	Slightly	Neither One Nor The Other	Slightly	Quite	Extremely	
Appreciated	:	:	:	:	:	:	:	Unappreciated
Excitable	:	:	:	:	:	:	:	Calm
Efficient	:	:	:	:	:	:	:	Inefficient
Penalized	:	:	:	:	:	:	:	Rewarded
Interested	:	:	:	:	:	:	:	Bored
Uncooperative	:	:	:	:	:	:	:	Cooperative
Satisfied	:	:	:	:	:	:	:	Dissatisfied
Unproductive	:	:	:	:	:	:	:	Productive
Encouraged	:	:	:	:	:	:	:	Discouraged
Attentive	:	:	:	:	:	:	:	Inattentive
High Strung	:	:	:	:	:	:	:	Serene
Valuable	:	:	:	:	:	:	:	Worthless
Unreliable	:	:	:	:	:	:	:	Reliable
Spirited	:	:	:	:	:	:	:	Lifeless
Useless	:	:	:	:	:	:	:	Useful
Listless	:	:	:	:	:	:	:	Alert
Relaxed	:	:	:	:	:	:	:	Tense
Ineffective	:	:	:	:	:	:	:	Effective
Informed	:	:	:	:	:	:	:	Uninformed
Unimportant	:	:	:	:	:	:	:	Important

Name: _____

APPENDIX B

EXPERIMENTAL INSTRUCTIONS

INSTRUCTIONS TO REGULAR SUBJECTS

You are about to participate in a group decision making exercise. You will work in a group to which you have been assigned by the instructor. The exercise is one with which you are already familar: The Desert Survival Problem. The task is to rank the same 15 items as before, but this time as a group. Discuss the problem as a group until there is agreement as to the ranking of the items. You must find an overall ranking with which the entire group can agree--no abstentions, please! Your group ranking should be recorded on a single answer sheet with the names of all of the members of your group at the top of the sheet. You will have 45 minutes to complete the task.

Your original ranking is being returned to you for your own use as you participate in the exercise. In this way each person will have a list of the items before him. It may help to jog your memory as to your ideas about the problem and so enable you to make a greater contribution to the group discussion. The sheet can also be used for scratch paper. Remember, however, that the ranking for your group must be recorded on the sheet of paper provided for the group.

Thank You

INSTRUCTIONS TO "GOOD INFO" SUBJECTS

You are about to participate in a group decision making exercise. You will work in a group to which you have been assigned by the instructor. The exercise is one with which you are already familiar: The Desert Survival Problem. The task is to rank the same 15 items as before, but this time as a group. Discuss the problem as a group until there is agreement as to the ranking of the items. You must find an overall ranking with which the entire group can agree--no abstentions please! Your group ranking should be recorded on a single answer sheet with the names of all of the members of your group at the top of the sheet. You will have 45 minutes to complete the task.

An individual ranking, <u>not</u> your own, is being returned to you. This ranking is based on the decision to stay with the wreckage and wait for rescue. To help me demonstrate certain aspects of group decision-making processes, please do your best to try to influence the decision of your group in this direction. Do not try to force the group--if they won't come to your position, you must go to theirs. You are the only member of your group to receive these special instructions. It is very important that (1) the other members do not know of these instructions until after the exercise is completed, and (2) you behave as if you <u>really</u> believe in the position you are arguing for. The reason for this request will be explained at the end of exercise.

Thank you

INSTRUCTIONS TO "POOR INFO" SUBJECTS

You are about to participate in a group decision making exercise. You will work in a group to which you have been assigned by the instructor. The exercise is one with which you are already familiar: The Desert Survival Problem. The task is to rank the same 15 items as before, but this time as a group. Discuss the problem as a group until there is agreement as to the ranking of the items. You must find an overall ranking with which the entire group can agree--no abstentions, please! Your group ranking should be recorded on a single answer sheet with the names of all of the members of your group at the top of the sheet. You will have 45 minutes to complete the task.

An individual ranking, <u>not</u> your own, is being returned to you. This ranking is based on the decision to leave the crash site and walk to the mining camp. To help me demonstrate certain aspects of group decision-making processes, please do your best to try to influence the decision of your group in this direction. Do not try to force the group--if they won't come to your position, you must go to theirs. You are the only member of your group to receive these special instructions. It is very important that (1) the other members do not know of these instructions until after the exercise is completed, and (2) you behave as if you <u>really</u> believe in the position you are arguing for. The reason for this request will be explained at the end of the exercise.

Thank you

POST-TEST INSTRUCTIONS - ALL SUBJECTS

So that we will have a complete set of data for decision making analysis, you are asked to complete the Desert Survival Problem a third and final time. You are to do this ranking as an individual again. You have now had considerable experience with the problem. You also have the benefit of others' ideas and a group discussion about those ideas. Take this opportunity to try to bring together all of the information you have about the problem and make the very best decision you can. You have ten minutes.

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BIOGRAPHICAL SKETCH

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In 1966, Ms. Jewell received a Master of Arts degree with a major in psychology from Southern Illinois University in Carbondale, Illinois. During the next nine years she worked in applied research at Purdue University; as a business manager in Atlanta, Georgia; as Director of Research and Training in an Atlanta family counseling center; and as a management consultant for an Atlanta consulting firm. In 1975 she entered the management doctoral program in the College of Business Administration at the Unviersity of Florida. Her special area of interest is organizational behavior.

Ms. Jewell is married to Donald O. Jewell. They have one daughter, Jennifer Elizabeth.

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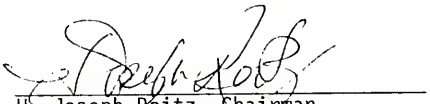

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Professor of Management

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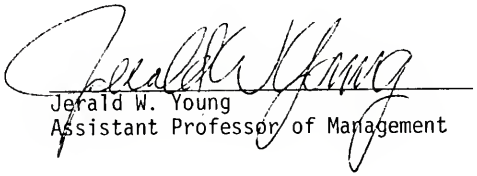

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This dissertation was submitted to the Graduate Faculty of the Department of Management in the College of Business Administration and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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